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Analysis of Solid Waste: Performance Data for SW-846 Methods 8270, 8081, and 8141

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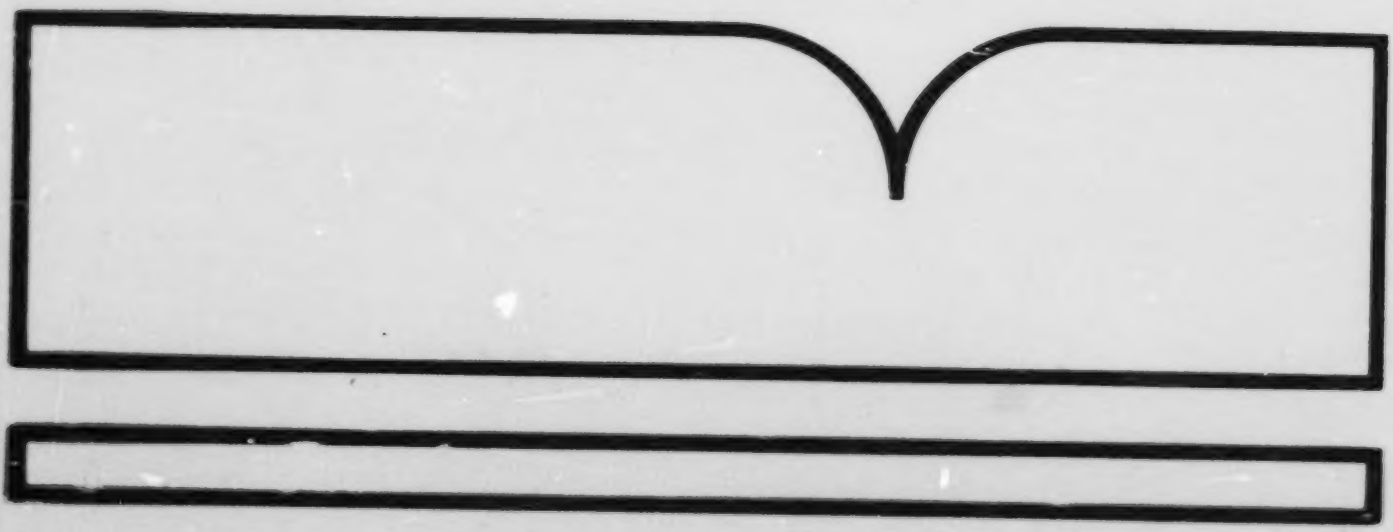

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ABSTRACT

Three SW-846 analytical methods (8270 [semivolatile organics], 8081 [organochlorine pesticides], and 8141 [organophosphorus insecticides]) can be used in conjunction with extraction procedures (Methods 3540 or 3550) and sample clean-up (Methods 3640 and draft 3670) to measure almost all of the Best Demonstrated Available Technology (BDAT) list chemicals in three waste matrices with recoveries of 40-70 percent. However, several analytes can not be measured using these gas chromatographic techniques: toluene di-isocyanate, the four diaminotoluene isomers (2,4-, 2,3-, 2,6, and 3,4-), nor any methylcyclohexylamine isomers.

SECTION 1

INTRODUCTION

The U.S. Environmental Protection Agency (U.S. EPA) has developed a Best Demonstrated Available Technology (BDAT) list of specific chemicals to be monitored in treated wastes before land disposal. Reliable measurement of these chemicals in wastes is a measurement issue facing the Office of Solid Waste and the Office of Research and Development.

The Office of Solid Waste has promulgated standard methods in "Test Methods for Evaluating Solid Waste" (SW-846) that can be used to analyze BDAT list chemicals; unfortunately, the U.S. EPA lacks recovery data for these chemicals from many waste matrices. This report provides data for the precision and accuracy of recoveries of BDAT chemicals from fly ash, sewage sludge, and a petroleum still bottom.

SECTION 2

CONCLUSIONS

Three SW-846 analytical methods (8270 [semi-volatile organics], 8081 [organochlorine pesticides], and 8141 [organophosphorus insecticides]) can be used in conjunction with extraction procedures (Methods 3540 or 3550) and sample clean-up (Methods 3640 and draft-3670) to measure almost all of the BDAT list chemicals in waste matrices. Surrogates added at the time of sample extraction provide a reliable measure of method performance for measuring analytes with similar chemical properties.

Several analytes are not measured using these gas chromatographic techniques: toluene di-isocyanate, the four diaminotoluene isomers (2,4-, 2,3-, 2,6-, and 3,4-), and all methylcyclohexylamine isomers. Ortho- and para-toluidine were not resolved and must be measured as the sum of both compounds.

Analyte recoveries from fly ash, sewage sludge, and petroleum still bottom were generally in the 40-70 percent range except for 2-picoline (20-60 percent), phenol(20-60 percent), the nitroso compounds (20-80 percent), and the non-detected chemicals listed above. Strongly polar chemicals generally present greater difficulties than most neutral species using gas chromatography/mass spectrometry (GC/MS). The high level of co-extracted interferences in these matrices necessitated the use of high spiking levels in the study. It is clear that it may be difficult to achieve BDAT target detection limits in complex matrices.

Because of the problems caused by matrix inferences, sample preparation can be a critical element in the analysis of waste matrices. Sample size of 30 g was appropriate for the fly ash samples, a sample size of 2 g was appropriate for sewage sludge and the still bottom. Use of the smaller sample size increases the minimum concentration of BDAT list chemicals that are detected using these methods. Soxhlet extraction removed more material from the waste samples; this resulted in generally higher recoveries of spiked analytes, particularly acidic compounds. Sonication worked best for the analysis of organochlorine pesticides in sewage sludge and still bottoms; use of Soxhlet extraction increased the levels of co-extracted interferences which masked the analytes. Sample cleanup by gel permeation chromatography (GPC, Method 3640) reduced interferences in Methods 8081 (organochlorine pesticides) and 8270 (organic semivolatiles).

Detection levels for organochlorine pesticides were 100-fold lower using gas chromatography/electron capture detection (GC/ECD); GC/MS should be used to measure these chemicals only when high concentrations are known or strongly suspected. Hexachloroethane can be added as a Method 8081 analyte.

sevage sludge and still bottom determinations. Sample extracts analyzed for organochlorine pesticides should be prepared using GPC and Florisil chromatography. Even with these procedures, early eluting pesticides were difficult to measure. Particular difficulties were encountered in the analysis of samples extracted using the Soxhlet technique (Method 3540).

Results for organophosphorus (OP) insecticides were less conclusive. While the recoveries were generally >75 percent, the spiking levels were too high. Previous work has demonstrated that higher OP recoveries are correlated with larger spiking concentrations[1]. The levels spiked in this study were 5-10 fold those recommended by the EMSL-LV, they exceeded what should be expected in most solid waste matrices.

methods (i.e. 1624 and 1625) should be considered as a means to establish method interferences and analyte recoveries prior to developing a site-specific sampling and analysis plan. In addition, well characterized real-world matrices (similar to those found at a site or in a waste stream) could be used to establish method performance. Unfortunately, the availability of characterized, real-world matrices is currently limited. The U.S. EPA should develop a "library" of characterized wastes that could be used for our quality assurance program.

SECTION 3

RECOMMENDATIONS

While Methods 8081 (organochlorine pesticides), 8141 (organophosphorus insecticides) and 8270 (organic semivolatiles) are adequate for routine monitoring of BDAT list analytes, some improvements could be made, particularly in the preparation of samples containing organochlorine pesticides. The relevance of including relatively unstable analytes (toluene di-isocyanate, diaminotoluenes, and methylcyclohexane) in the BDAT list should be reviewed. If these compounds remain on the list, liquid chromatographic methods will be required for their analysis.

The sampling section of SW-846 requires improved guidance on how to better obtain representative small volume samples of complex matrices. A sample size of 30 g is too large for many waste matrices because those extracts must be diluted prior to analysis or clean-up (e.g. GPC or Florisil cartridges).

Better guidance is required in Method 3640 on dilution of extracts prior to GPC clean-up; a dilution criteria based on optical density should be investigated. Use of solid phase clean-up media such as Empore™ disks or SPE cartridges could improve the reliability of analysis of BDAT list chemicals. Problems such as overloading the solid phase media and particulates in samples must be more fully understood before solid phase clean-up will be rugged enough for routine application.

Co-extracted interferences can be a significant problem in the analysis of organochlorine pesticides using Method 8081. The organochlorine pesticide option in GPC clean-up (Method 3640) should always be used prior to analysis of waste samples using Method 8081. Collection of the fraction eluting after the phthalates does not reduce recoveries of organochlorines and removes a significant amount of matrix interference.[2] The Diol bonded phase does not reliably remove interferences in organochlorine pesticide analysis, Florisil should be used.[3] Use of the Hall detector (electrolytic conductivity detector [ELCD]) should be investigated as a means to reduce interferences in Method 8081, albeit at the cost of somewhat higher method detection limits. Hexachloroethane could be added as a method analyte, while 4-bromophenyl phenyl ether, bis-(2-chloroisopropyl)ether, and 2-chloroethylvinyl ether should not be added. GC/MS analysis of organochlorine pesticides, using Method 8270, lacks sensitivity, alternate GC/MS methods (e.g. negative ion-chemical ionization or ion trap) should be adopted for RCRA analyses.

Because method performance is very dependent on the nature of the sample to be analyzed, better techniques are required to establish the accuracy and precision of measurements at a specific location. Use of isotope dilution

SECTION 4

EXPERIMENTAL

The analytical measurements were performed by S-Cubed, Division of Maxwell laboratories of San Diego, CA. S-Cubed is a sub-contractor to Lockheed Engineering Sciences Company (LESC), on-site contractor to EMSL-LV. This study was conducted in three stages: first, three real-world samples were selected and analyzed to determine potential interferences; second, spiking levels for the BDAT list analytes were selected after consultation with S-Cubed, LESC, and EMSL-LV; finally, spiked samples were analyzed in triplicate to establish method bias and precision.

Three real-world matrices were selected and analyzed in phase one of the study. Table 1 summarizes the characteristics of the wastewater sludge, fly ash, and still bottom matrices. Sewage sludge contained phenol, phthalates, substituted phenols, hydrocarbons and C_5-C_{15} fatty acids; these compounds were interferences in both GC/MS and GC/ECD analyses. The fly ash contained only one significant unknown compound as an interference; the matrix retained acidic compounds (e.g. phenols). The still bottom contained many non-target hydrocarbons; these compounds were interferences in both GC/MS and GC/ECD analyses.

Spiking cocktails were selected in phase two of the study; these are listed in Tables 2-4 with the expected concentrations of the analytes in the sample matrices. The spiking cocktail for Method 8270 (Table 2) included the organochlorine pesticides normally measured using GC/ECD (Method 8081). The GC/MS detection levels for the cyclodiene compounds were generally higher than other Method 8270 analytes; endrin aldehyde was not detected. Isomers of diaminotoluene, toluidine, and methylcyclohexylamine were not all resolved by chromatography or mass spectrometry using Method 8270; therefore, only representative isomers were included in the spiking cocktail. Surrogates for Method 8270 are those recommended in the method. The list of chemicals for Method 8081 (Table 3) include three compounds not listed as method analytes: 4-bromophenyl phenyl ether, bis-(2-chloroisopropyl)ether, and hexachloroethane. Two surrogates were used for Method 8081: tetra-chloro-meta-xylene and decachlorobiphenyl. Ethion was used as a surrogate for Method 8141 (Table 4).

Recoveries of the spiked compounds were established in phase three of the study. The procedures used to prepare and analyze the spiked matrices are summarized in Table 5. Aliquots of each spiked sample were extracted using Soxhlet (Method 3540) and Sonication (Method 3550). Appropriate clean-up procedures were used on these extracts: GPC (Method 3640) for GC/MS and GPC with Diol cartridge [draft-Method 3670]) for GC/ECD analysis. Triplicate analyses were made for every preparation/analysis combination. Results of

TABLE 1. DESCRIPTION OF WASTE MATRICES

Matrix	Source	Description	pH	%Moisture	Extract Color After GPC
Wastewater Sludge	San Diego Waste Water Treatment Plant	Liquid Sludge	8.0	91	Amber
Ash	Flyash Precipitator	Dry Powder	10.4	1.1	Clear
Tar	Petroleum Refinery Still Bottoms	Very Viscous Tar	-	-	Black

TABLE 2. METHOD 8270 SPIKING COCKTAIL

Compound	Amount Spiked (µg)	Expected Concentration in Final Extract (µg/mL)	Concentration Spiked into the Sample: Sludge and still bottoms (µg/g)	Concentration Spiked into the Sample: Flyash (µg/g)
Aldrin	100	50	50	3.3
α-BHC	100	50	50	3.3
β-BHC	100	50	50	3.3
δ-BHC	100	50	50	3.3
γ-BHC	100	50	50	3.3
4-Bromophenyl phenyl ether	100	50	50	3.3
α-Chlordane	500	250	250	17
γ-Chlordane	500	250	250	17
bis(2-Chloroisopropyl)ether	100	50	50	3.3
2-Chloronaphthalene	100	50	50	3.3
DDD	100	50	50	3.3
DDE	100	50	50	3.3
DDT	100	50	50	3.3
Dieldrin	100	50	50	3.3
2,4-Dinitrotoluene	100	50	50	3.3
2,6-Dinitrotoluene	100	50	50	3.3
1,2-Diphenylhydrazine	100	50	50	3.3
Endosulfan I	500	250	250	17
Endosulfan II	500	250	250	17
Endrin	500	250	250	17
Endrin aldehyde	a	-	-	-
Heptachlor	100	50	50	3.3
Heptachlor epoxide	100	50	50	3.3
Hexachlorobutadiene	100	50	50	3.3
Hexachlorocyclopentadiene	500	250	250	17
Hexachloroethane	100	50	50	3.3
3-Methylcyclohexylamine	100	50	50	3.3
Methylcyclorhexanone	100	50	50	3.3
Nitrobenzene	100	50	50	3.3
Nitrosodi-n-propylamine	100	50	50	3.3
N-Nitrosodimethylamine	100	50	50	3.3
Nitrotoluene	100	50	50	3.3
Phenol	100	50	50	3.3
2-Picoline	100	50	50	3.3
Pronamide	100	50	50	3.3
2,3-Toluene diamine	100	50	50	3.3
2,4-Toluene diamine	b	-	-	-

(continued)

TABLE 2. (Continued)

Compound	Amount Spiked (µg)	Expected Concentration in Final Extract (µg/mL)	Concentration Spiked into the Sample: Sludge and still bottoms (µg/g)	Concentration Spiked into the Sample: Flyash (µg/g)
2,6-Toluene diamine	100	50	50	3.3
3,4-Toluene diamine	c	-	-	-
Toluene diisocyanate	500	250	250	17
o-Toluidine	100	50	50	3.3
p-Toluidine	d	-	-	-

a Not spiked, unstable in the mixture.
b Not spiked, not resolved from the 2,6 isomer.
c Not spiked, not resolved from the 2,3 isomer.
d Not spiked, not resolved from the ortho isomer.

TABLE 3. METHOD 8081 SPIKING COCKTAIL

Compound	Amount Spiked (µg)	Concentration in Final Extract (ng/mL)	Conc. in the Sample: Sludge and still bottoms (ng/g)	Conc. in the Sample: Flyash (ng/g)
Aldrin	1	50	500	33
α-BHC	1	50	500	33
β-BHC	1	50	500	33
δ-BHC	1	50	500	33
γ-BHC	1	50	500	33
4-Bromophenyl phenyl ether	10	500	5000	330
α-Chlordane	2	100	1000	67
γ-Chlordane	2	100	1000	67
bis(2-Chloroisopropyl)ether	10	500	5000	330
DDD	2	100	1000	67
DDE	2	100	1000	67
DDT	2	100	1000	67
Dieldrin	1	50	500	33
Endosulfan I	2	100	1000	67
Endosulfan II	2	100	1000	67
Endrin	1	50	500	33
Endrin aldehyde	2	100	1000	67
Heptachlor	1	50	500	33
Heptachlor epoxide	1	50	500	33
Hexachloroethane	10	500	5000	330

TABLE 4. METHOD 8141 SPIKING COCKTAIL

Compound	Amount Spiked (µg)	Concentration in Final Extract (µg/mL)	Conc. in the Sample: Sludge and still bottoms (µg/g)	Conc. in the Sample: Flyash (µg/g)
Azinphos methyl	75	7.5	38	2.5
Bolstar	75	7.5	38	2.5
Coumaphos	75	7.5	38	2.5
DDVP	100	10	50	3.3
Diazinon	75	7.5	38	2.5
Ethoprop	75	7.5	38	2.5
Ethyl parathion	75	7.5	38	2.5
Fensulfothion	75	7.5	38	2.5
Phorate	75	7.5	38	2.5
Tetrachlvinphos	100	10	50	3.3

TABLE 5. ANALYTICAL METHOD EMPLOYED

Method 3550 - Sonication Extraction	
Sample Size:	30 g Lov; 2 g Medium/High
Solvent:	1:1 Methylene Chloride/Acetone
Instrument Used:	Heat Systems WP-385
Method 3540 - Soxhlet Extraction	
Sample Size:	10 g
Solvent:	Methylene Chloride
Method 3640 - GPC Cleanup	
Sample Size:	5.0 mL
Collection Program:	85% of Phthalates to Perylene
Instrument Used:	ABC Autoprep 1002A
Method 8081 - Megabore Capillary Organochlorine Pesticide Analysis	
Cleanup:	GPC, Diol Cartridge*
Columns:	DB608, 30 m, 0.52 mm Diameter
Instrument:	HP 5890 ECD Gas Chromatograph Packed Column Injector HP 7673 Autosampler
Method 8140 - Method Capillary Organophosphate Pesticide Analysis	
Cleanup:	None
Columns:	DB608, 30m, 0.52 mm Diameter
Instrument:	HP 5880 FPD Gas Chromatograph Packed Column Injector HP 7673 Autosampler
Method 8270 - Semivolatile Analysis by GC/MS	
Cleanup:	GPC (Method 3640)
Column:	DB-5, 30 m, 0.25 mm Diameter
Instrument:	Finnigan 4500 GC/MS/DS HP 7673 Autosampler

*Florisil, cartridge cleanup draft Method 3670, is now recommended over Diol.

these individual measurements were used to calculate mean recoveries and standard deviations for each analyte from the three matrices.

SECTION 5

RESULTS AND DISCUSSION

Analyte recoveries and method precision are summarized in Tables 6-8, complete tabular results of recoveries are provided in Appendix A, and sample chromatograms are provided in Appendix B.

Analysis of semi-volatiles using Method 8270 gave recoveries of 40-70 percent for most analytes (Table 6); somewhat higher recoveries were obtained using Soxhlet extraction (Method 3540). Lower recoveries were observed in the analysis of the still bottom samples and for substituted phenols (particularly using sonication [Method 3550]). Negligible recoveries were obtained for toluene di-isocyanate, diaminotoluenes, and methylcyclohexylamine even when they were spiked individually prior to analysis. Recoveries of greater than 100 percent were obtained for several organochlorine pesticides, presumably because of method interference and calibration difficulties caused by the relatively high concentrations required for GC/MS analysis.

Analysis of organochlorine pesticides using Method 8081 gave recoveries of 40-70 percent for most analytes (Table 7). All BDAT list 8081 targets were separated using a DB-608 column (J & W Scientific, Folsom, CA). Hexachloroethane can be added as a method analyte if a lower initial oven temperature is used; 4-bromophenyl phenyl ether, bis-(2-chloroisopropyl)ether, and 2-chloroethylvinyl ether should not be added. Interference from co-extracted materials was a problem in the analysis of sewage sludge and the still bottoms. Recoveries of early-eluting pesticides from sewage sludge showed high bias and poor precision, particularly when Soxhlet extraction was used. The surrogate decachlorobiphenyl was not detected in some sewage sludge extracts.

Analysis of organophosphorus (OP) insecticides using Method 8141 gave recoveries of 75-95 percent for most analytes (Table 8). These recoveries were higher than those obtained using Methods 8081 and 8270 because the OP spiking level was five to ten times what the EMSL-LV recommended and no clean-up of extracts was employed.

TABLE 6. PERCENT RECOVERY OF SEMIVOLATILES (METHOD 8270)

	Sludge				Still Bottom				Fly Ash			
	Sonication		Soxhlet		Sonication		Soxhlet		Sonication		Soxhlet	
	Average	Std	Average	Std	Average	Std	Average	Std	Average	Std	Average	Std
SURROGATES												
2-Fluorophenol	29	15	54	1	46	2	28	9	28	17	49	4
D5-Phenol	33	13	54	2	41	2	27	8	33	14	52	3
D5-Nitrobenzene	46	12	56	5	50	2	42	13	49	11	64	4
2-Fluorobiphenyl	54	11	69	3	56	12	38	9	59	8	67	3
2,4,6-Tribromophenol	75	23	74	11	37	7	37	7	7	4	78	3
D14-Terphenyl	73	13	77	6	86	4	50	11	90	1	79	5
ANALYTES												
N-Nitrosodimethylamine	32	31	59	51	37	33	39	11	20	35	80	22
2-Picoline	23	9	63	6	50	6	34	11	33	25	45	7
3-Methylcyclohexylamine	0	0	0	0	0	0	0	0	0	0	0	0
2-Methylcyclohexanone	44	10	78	2	60	8	49	18	59	19	76	7
Phenol	34	13	57	2	38	3	24	8	33	14	49	2
Bis(2-Chloro-isopropyl)ether	56	15	71	6	65	6	47	12	64	16	77	2
Hexachloroethane	54	15	85	9	58	2	46	12	68	11	86	6
o-Toluidine	59	13	87	6	25	11	0	0	60	8	95	11
Di-n-propylnitrosamine	50	2	72	9	62	8	40	11	72	27	75	6
Nitrobenzene	55	14	67	4	64	4	53	17	62	15	79	7
Toluene di-isocyanate	0	-	0	-	0	-	0	-	0	-	0	-
Hexachlorobutadiene	62	18	87	4	65	2	69	20	80	18	91	5
o-Nitrotoluene	42	10	55	1	45	4	36	11	51	8	60	4
m-Nitrotoluene	65	14	94	4	70	2	50	11	80	12	94	5
p-Nitrotoluene	68	17	96	2	69	2	53	14	85	14	96	6
2,3-Diaminotoluene	0	-	0	-	0	-	0	-	0	-	11	19
2,6-Diaminotoluene	0	-	0	-	0	-	0	-	5	8	46	43
Hexachlorocyclopenta-diene	44	9	19	4	11	5	0	-	60	9	53	10
2-Chloronaphthalene	54	14	72	9	51	5	25	18	70	16	75	4
2,6-Dinitrotoluene	69	14	79	4	62	8	37	10	83	8	86	1
2,4-Dinitrotoluene	63	15	68	2	49	4	30	10	71	7	79	4
1,2-Diphenylhydrazine	55	12	64	5	51	2	45	11	63	8	73	2
4-Bromophenylphenylether	89	24	106	10	78	3	87	16	108	11	124	3
A-BHC	83	19	97	9	70	3	75	16	94	11	107	2
B-BHC	93	25	112	12	75	4	90	25	118	10	134	2
G-BHC	77	20	96	9	62	6	72	17	90	9	108	3
D-BHC	84	23	100	9	58	5	76	20	99	9	116	4
Pronamide	72	15	83	5	70	5	48	12	91	14	92	2
Heptachlor	69	9	73	3	63	7	37	8	93	16	95	1
Aldrin	37	5	47	8	44	4	39	11	71	13	86	1
Heptachlor epoxide	71	15	102	10	58	5	59	19	85	14	102	1
Endosulfan I	75	11	96	8	63	6	58	13	76	6	85	1
Gamma-chlordane	68	9	69	7	54	7	40	7	71	6	70	1
Alpha-chlordane	62	9	59	6	44	6	32	7	68	5	68	1
DDE	74	21	89	9	48	8	49	13	91	7	97	5
Dieldrin	68	15	92	4	53	6	57	20	84	18	94	3
Endrin	88	19	121	17	71	13	71	11	95	7	114	1
Endosulfan II	78	16	102	11	59	9	64	16	79	7	91	3
DDD	117	43	97	52	52	9	76	23	150	22	173	15
DDT	70	14	70	24	34	10	16	6	109	15	117	5

TABLE 7. PERCENT RECOVERIES OF ORGANOCHLORINE PESTICIDES

	Sludge				Still Bottom				Fly Ash			
	Sonication		Soxhlet		Sonication		Soxhlet		Sonication		Soxhlet	
	Average	Std	Average	Std	Average	Std	Average	Std	Average	Std	Average	Std
SURROGATES												
Tetra-cl-m-xylene	71	19	82	1	49	2	176	211	119	12	57	41
Decachlorobiphenyl	26	23	28	48	17	29	104	93	49	2	57	11
ANALYTES												
Hexachloroethane	80	7	79	1	70	2	50	30	81	3	54	39
2-Chloronaphthalene	50	56	67	8	59	3	35	35	48	3	39	36
4-Br-diphenylether	118	14	0	-	159	19	128	137	37	64	118	70
A-BHC	88	25	265	18	55	7	47	25	45	3	38	24
G-BHC	55	9	155	29	43	6	30	30	47	3	41	23
Heptachlor	60	13	469	294	48	6	55	18	53	2	46	26
Aldrin	92	33	875	734	48	5	200	258	49	3	46	22
B-BHC	351	71	150	260	51	7	75	42	62	3	58	23
D-BHC	51	11	57	2	43	4	119	129	49	3	43	20
Hept. epoxide	54	11	70	3	47	6	66	34	53	2	51	17
Endosulfan I	52	11	70	4	47	4	41	18	52	3	52	15
G-Chlordane	50	9	65	1	48	5	47	13	53	3	52	16
A-Chlordane	49	8	66	0	45	5	37	21	53	3	53	15
DDE	52	11	74	1	45	4	70	40	51	3	53	14
Dieldrin	89	19	327	7	45	5	58	24	52	3	50	16
Endrin	56	10	92	15	50	6	41	23	55	2	36	35
Endosulfan II	52	10	88	11	49	5	46	17	54	2	56	12
DDT	57	10	95	17	49	4	40	29	56	3	57	16
Endrin aldehyde	45	6	42	10	40	4	29	20	50	2	47	19
DDD	57	11	99	8	48	5	35	21	54	3	55	13

TABLE 8. PERCENT RECOVERY OF ORGANOPHOSPHOROUS PESTICIDES

	Sludge				Still Bottom				Fly Ash			
	Sonication		Soxhlet		Sonication		Soxhlet		Sonication		Soxhlet	
	Average	Std	Average	Std	Average	Std	Average	Std	Average	Std	Average	Std
SURROGATES												
Ethion	78	4	85	4	78	4	85	4	78	4	85	4
ANALYTE												
Dichlorvos	74	4	93	10	84	4	48	6	61	4	87	2
Ethoprop	76	4	88	4	85	4	85	5	73	3	85	1
Phorate	74	5	83	1	81	3	81	4	71	3	81	2
Diazinon	79	4	85	4	85	4	88	6	75	0	85	4
Ethyl parathion	78	4	87	<1	84	4	80	7	78	4	87	<1
Tetrachlorvinphos	62	27	74	4	75	8	57	4	73	2	83	2
Bolstar	77	4	88	2	81	5	80	5	76	3	84	2
Fensulfothion	82	5	136	51	87	<1	53	3	76	12	96	10
Methyl Azinophos	82	8	72	9	72	9	33	6	76	4	73	0
Coumaphos	81	3	83	7	83	5	59	6	75	2	84	3

NS: Not spiked.
N/A: Not applicable.

REFERENCES

1. Taylor, V., D. M. Hickey, and P. Marsden. "Single Laboratory Validation of EPA Methods 8140 and 8141", 600/4-87/009, D. Betowski, technical monitor, EMSL-LV.

2. Marsden, P. J., V. Taylor, M. R. Kennedy. "Evaluation of Method 3640 Gel Permeation Cleanup"; Contract No. 68-03-3375, U.S. Environmental Protection Agency, Cincinnati, Ohio, pp. 100, 1987.

3. Lopez-Avila, Viorica, J. Benedicto, and J. Milanes. "Evaluation of Sample Extract Cleanup Using Solid-Phase Extraction Cartridges", 600/4-89/049, W. Beckert, technical monitor, EMSL-LV.

APPENDIX A

Contains tables of recoveries for each analyte and surrogate from each sample analyzed using Methods 8270, 8081, and 8141. The following codes apply:

FA	Flyash
FASN	Flyash extracted using sonication
FASX	Flyash extracted using Soxhlet
SS	Sewage sludge
SSSN	Sewage sludge extracted using sonication
SSSX	Sewage sludge extracted using Soxhlet
SB	Still bottom
SBSN	Still bottom extracted using sonication
SBSX	Still bottom extracted using Soxhlet

PEST-2

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

PESTICIDE / TYPE: SONICATION

	FA-1	FA-2	FA-3	AVERAGE	STD
****SURR****					
TETRA-CL-M-XYLENE	108	116	133	119	12
DECACHLOROBIPHENYL	46	50	50	49	2
****COMPOUND****					
HEXACHLOROETHANE	78	80	84	81	3
2-CHLORONAPHTHALENE	45	48	50	48	3
4-BR-DIPHENYLETHER	0	111	0	37	64
A-BHC	43	45	48	45	3
G-BHC	44	47	49	47	3
HEPTACHLOR	51	53	55	53	2
ALDRIN	47	50	52	49	3
B-BHC	59	63	65	62	3
D-BHC	46	50	52	49	3
HEPT.EPOXIDE	51	54	55	53	2
ENDOSULFAN I	49	53	54	52	3
G-CHLORDANE	50	54	56	53	3
A-CHLORDANE	50	54	56	53	3
DDE	48	52	54	51	3
DIELDRIN	49	52	55	52	3
ENDRIN	53	54	57	55	2
ENDOSULFAN II	51	54	56	54	2
DDT	52	57	59	56	3
ENDRIN ALDEHYDE	48	51	53	50	2
DDD	51	54	56	54	3

NS:NOT SPIKED
N/A:NOT APLICABLE
STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

PEST-3

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

PESTICIDE / TYPE: SONICATION

	SS-1	SS-2	SS-3	AVERAGE	STD
****SURR****					
TETRA-CL-M-XYLENE	61	59	94	71	19
DECACHLOROBIPHENYL	43	36	0	26	23
****COMPOUND****					
HEXACHLOROETHANE	75	77	87	80	7
2-CHLORONAPHTHALENE	18	17	114	50	56
4-BR-DIPHENYLETHER	120	132	104	118	14
A-BHC	109	95	60	88	25
G-BHC	58	62	44	55	9
HEPTACHLOR	71	64	45	60	13
ALDRIN	60	125	92	92	33
B-BHC	272	370	411	351	71
D-BHC	59	57	39	51	11
HEPT.EPOXIDE	64	55	42	54	11
ENDOSULFAN I	61	54	40	52	11
G-CHLORDANE	56	55	40	50	9
A-CHLORDANE	54	54	39	49	8
DDE	61	56	40	52	11
DIELDRIN	101	99	67	89	19
ENDRIN	62	61	45	56	10
ENDOSULFAN II	58	57	41	52	10
DDT	60	65	45	57	10
ENDRIN ALDEHYDE	49	48	38	45	6
DDD	64	63	45	57	11

NS:NOT SPIKED
N/A:NOT APLICABLE
STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

PEST-4

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

PESTICIDE / TYPE: SONICATION

	SB-1	SB-2	SB-3	AVERAGE	STD
****SURR****					
TETRA-CL-M-XYLENE	47	51	49	49	2
DECACHLOROBIPHENYL	50	0	0	17	29
****COMPOUND****					
HEXACHLOROETHANE	70	72	68	70	2
2-CHLORONAPHTHALENE	60	61	55	59	3
4-BR-DIPHENYLETHER	181	145	152	159	19
A-BHC	56	61	47	55	7
G-BHC	44	47	36	43	6
HEPTACHLOR	49	53	42	48	6
ALDRIN	52	50	42	48	5
B-BHC	57	54	43	51	7
D-BHC	43	48	39	43	4
HEPT.EPOXIDE	49	51	40	47	6
ENDOSULFAN I	47	51	43	47	4
G-CHLORDANE	48	53	44	48	5
A-CHLORDANE	46	50	40	45	5
DDE	47	48	40	45	4
DIELDRIN	46	49	40	45	5
ENDRIN	50	57	45	50	6
ENDOSULFAN II	50	53	43	49	5
DDT	51	52	45	49	4
ENDRIN ALDEHYDE	42	43	35	40	4
DDD	50	52	42	48	5

NS:NOT SPIKED
N/A:NOT APLICABLE
STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

PEST_7

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

PESTICIDE / TYPE: SOXHLET

	FA-1	FA-2	FA-3	AVERAGE	STD
****SURR****					
TETRA-CL-M-XYLENE	98	57	17	57	41
DECACHLOROBIPHENYL	68	45	58	57	11
****COMPOUND****					
HEXACHLOROETHANE	86	68	10	54	39
2-CHLORONAPHTHALENE	70	45	0	39	36
4-BR-DIPHENYLETHER	186	124	46	118	70
A-BHC	62	38	14	38	24
G-BHC	65	40	18	41	23
HEPTACHLOR	75	38	25	46	26
ALDRIN	68	44	25	46	22
B-BHC	82	57	35	58	23
D-BHC	64	40	24	43	20
HEPT.EPOXIDE	70	47	36	51	17
ENDOSULFAN I	69	48	40	52	15
G-CHLORDANE	69	48	38	52	16
A-CHLORDANE	70	49	40	53	15
DDE	69	47	43	53	14
DIELDRIN	68	41	41	50	16
ENDRIN	71	0	36	36	35
ENDOSULFAN II	69	48	50	56	12
DDT	75	44	51	57	16
ENDRIN ALDEHYDE	66	29	44	47	19
DDD	70	48	46	55	13

NS:NOT SPIKED
N/A:NOT APLICABLE
STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

PEST_8

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

PESTICIDE / TYPE: SOXHLET

	SS-1	SS-2	SS-3	AVERAGE	STD
****SURR****					
TETRA-CL-M-XYLENE	83	81	81	82	1
DECACHLOROBIPHENYL	84	0	0	28	48
****COMPOUND****					
HEXACHLOROETHANE	80	80	78	79	1
2-CHLORONAPHTHALENE	69	74	59	67	8
4-BR-DIPHENYLETHER	-	-	-	-	-
A-BHC	280	271	245	265	18
G-BHC	125	184	155	155	29
HEPTACHLOR	147	723	536	469	294
ALDRIN	774	196	1654	875	734
B-BHC	0	450	0	150	260
D-BHC	60	57	55	57	2
HEPT.EPOXIDE	73	71	67	70	3
ENDOSULFAN I	73	71	66	70	4
G-CHLORDANE	66	65	64	65	1
A-CHLORDANE	66	66	66	66	0
DDE	75	74	73	74	1
DIELDRIN	320	327	333	327	7
ENDRIN	83	83	109	92	15
ENDOSULFAN II	76	91	97	88	11
DDT	75	108	100	95	17
ENDRIN ALDEHYDE	34	54	39	42	10
DDD	94	94	108	99	8

NS:NOT SPIKED
N/A:NOT APLICABLE
STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

PEST_9

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

PESTICIDE / TYPE: SOXHLET

	SB-1	SB-2	SB-3	AVERAGE	STD
****SURR****					
TETRA-CL-M-XYLENE	419	38	72	176	211
DECACHLOROBIPHENYL	135	0	177	104	93
****COMPOUND****					
HEXACHLOROETHANE	19	50	80	50	30
2-CHLORONAPHTHALENE	0	37	69	35	35
4-BR-DIPHENYLETHER	0	111	272	128	137
A-BHC	36	29	75	47	25
G-BHC	0	30	59	30	30
HEPTACHLOR	66	34	64	55	18
ALDRIN	498	35	68	200	258
B-BHC	121	39	65	75	42
D-BHC	267	31	60	119	129
HEPT.EPOXIDE	102	35	61	66	34
ENDOSULFAN I	28	33	62	41	18
G-CHLORDANE	44	36	62	47	13
A-CHLORDANE	18	33	59	37	21
DDE	113	35	63	70	40
DIELDRIN	80	33	61	58	24
ENDRIN	21	36	67	41	23
ENDOSULFAN II	38	35	65	46	17
DDT	13	35	71	40	29
ENDRIN ALDEHYDE	10	26	50	29	20
DDD	14	35	56	35	21

NS:NOT SPIKED
N/A:NOT APLICABLE
STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

PEST-12

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS

(SONICATION)

	FA-1	FA-2	FA-3	AVERAGE	STD
****SURR****					
ETHION	79	74	81	78	4
****COMPOUND****					
DICHLORVOS					
ETHOPROP	59	66	59	61	4
PHORATE	70	76	73	73	3
DIAZINON	67	73	73	71	3
ETHYL PARATHION	75	75	75	75	0
TETRACHLORVINPHOS	73	80	80	78	4
BOLSTAR	70	74	74	73	2
FENSULFOTHION	73	77	77	76	3
METHYL AZINOPHOS	77	87	63	76	12
COUMAPHOS	73	80	73	76	4
	77	75	74	75	2

NS:NOT SPIKED

N/A:NOT APLICABLE

STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

PEST-13

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS

(SONICATION)

	SS-1	SS-2	SS-3	AVERAGE	STD
****SURR****					
ETHION	79	74	81	78	4
****COMPOUND****					
DICHLORVOS	76	69	76	74	4
ETHOPROP	78	72	79	76	4
PHORATE	77	68	77	74	5
DIAZINON	81	75	81	79	4
ETHYL PARATHION	80	73	80	78	4
TETRACHLORVINPHOS	93	48	44	62	27
BOLSTAR	80	73	80	77	4
FENSULFOTHION	87	77	83	82	5
METHYL AZINOPHOS	87	73	87	82	8
COUMAPHOS	79	79	85	81	3

NS:NOT SPIKED

N/A:NOT APLICABLE

STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

PEST-14

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS

(SONICATION)

	SB-1	SB-2	SB-3	AVERAGE	STD
****SURR****					
ETHION	79	74	81	78	4
****COMPOUND****					
DICHLORVOS	86	86	79	84	4
ETHOPROP	87	89	80	85	4
PHORATE	83	83	78	81	3
DIAZINON	88	88	81	85	4
ETHYL PARATHION	87	87	80	84	4
TETRACHLORVINPHOS	81	76	67	75	8
BOLSTAR	82	85	76	81	5
FENSULFOTHION	87	87	87	87	0
METHYL AZINOPHOS	80	73	61	72	9
COUMAPHOS	88	83	77	83	5

NS:NOT SPIKED

N/A:NOT APLICABLE

STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

PEST_17

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

(SOXHLET)

	FA-1	FA-2	FA-3	AVERAGE	STD
****SURR****					
ETHION	85	89	81	85	4
****COMPOUND****					
DICHLORVOS					
ETHOPROP	86	90	86	87	2
PHORATE	85	85	83	85	1
DIAZINON	82	83	79	81	2
ETHYL PARATHION	88	88	81	85	4
TETRACHLORVINPHOS	87	87	87	87	0
BOLSTAR	85	81	81	83	2
FENSULFOTHION	84	85	82	84	2
METHYL AZINOPHOS	90	90	107	96	10
COUMAPHOS	73	73	73	73	0
	88	83	82	84	3

NS:NOT SPIKED

N/A:NOT APLICABLE

STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

PEST_1B

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

(SOXHLET)

	SS-1	SS-2	SS-3	AVERAGE	STD
****SURR****					
ETHION	85	89	81	85	4
****COMPOUND****					
DICHLORVOS	93	103	83	93	10
ETHOPROP	88	91	84	88	4
PHORATE	83	83	82	83	1
DIAZINON	86	88	81	85	4
ETHYL PARATHION	87	87	87	87	0
TETRACHLORVINPHOS	74	78	70	74	4
BOLSTAR	89	89	85	88	2
FENSULFOTHION	127	190	90	136	51
METHYL AZINOPHOS	73	80	63	72	9
COUMAPHOS	84	89	75	83	7

NS:NOT SPIKED

N/A:NOT APLICABLE

STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

PEST_19

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.
(SOXHLET)

	SB-1	SB-2	SB-3	AVERAGE	STD
****SURR****					
ETHION	85	89	81	85	4
****COMPOUND****					
DICHLORVOS	45	55	45	48	6
ETHOPROP	84	90	80	85	5
PHORATE	83	83	77	81	4
DIAZINON	88	94	81	88	6
ETHYL PARATHION	80	87	73	80	7
TETRACHLORVINPHOS	59	59	52	57	4
BOLSTAR	78	85	75	80	5
FENSULFOTHION	53	57	50	53	3
METHYL AZINOPHOS	37	35	26	33	6
COUMAPHOS	61	64	52	59	6

NS:NOT SPIKED
N/A:NOT APLICABLE
STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

ABN_1

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS

(SONICATION) PAGE: 1/2

	FASN1	FASN2	FASN3	AVERAGE	STD
****SURR****					
2-FLUOROPHENOL	17	47	19	28	17
D5-PHENOL	25	50	25	33	14
D5-NITROBENZENE	45	61	41	49	11
2-FLUOROBIPHENYL	55	68	55	59	8
2,4,6-TRIBROMOPHENOL	11	4	5	7	4
D14-TERPHENYL	89	90	90	90	1
****COMPOUND****					
N-NITROSODIMETHYLAMINE	0	61	0	20	35
2-PICOLINE	20	61	16	33	25
3-METHYLCYCLOHEXYLAMINE	0	0	0	0	0
4-METHYLCYCLOHEXYLAMINE	NS	NS	NS	N/A	N/A
2-METHYLCYCLOHEXYLAMINE	NS	NS	NS	N/A	N/A
2-METHYLCYCLOHEXANONE	48	80	48	59	19
PHENOL	26	50	25	33	14
BIS(2-CHLOROISOPROPYL)ETHER	57	82	53	64	16
HEXACHLOROETHANE	67	78	57	68	11
O-TOLUIDINE	57	69	53	60	8
P-TOLUIDINE	NS	NS	NS	N/A	N/A
DI-N-PROPYLNITROSAMINE	56	103	56	72	27
NITROBENZENE	56	79	50	62	15
TOLUENE DI-ISOCYANATE	0	0	0	0	0
HEXACHLOROBUTADIENE	92	90	59	80	18
O-NITROTOLUENE	54	56	42	51	8
M-NITROTOLUENE	89	84	66	80	12
P-NITROTOLUENE	95	90	69	85	14
3,4-DIAMINOTOLUENE	NS	NS	NS	N/A	N/A
2,3-DIAMINOTOLUENE	0	0	0	0	0
2,4-DIAMINOTOLUENE	NS	NS	NS	N/A	N/A
2,6-DIAMINOTOLUENE	0	2	14	5	8
HEXACHLOROCYCLOPENTADIENE	71	57	53	60	9
2-CHLORONAPHTHALENE	88	64	57	70	16
2,6-DINITROTOLUENE	91	84	75	83	8
2,4-DINITROTOLUENE	76	74	63	71	7
1,2-DIPHENYLHYDRAZINE	70	63	55	63	8
4-BROMOPHENYLPHENYLETHER	119	108	97	108	11
A-BHC	104	94	82	94	11
B-BHC	128	115	110	118	10
G-BHC	99	91	81	90	9
D-BHC	109	96	91	99	9
PRONAMIDE	106	90	79	91	14
HEPTACHLOR	109	92	78	93	16

NS:NOT SPIKED

N/A:NOT APLICABLE

STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

ABN_1

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS

(SONICATION) PAGE: 2/2

	FASN1	FASN2	FASN3	AVERAGE	STD
ALDRIN	85	68	61	71	13
HEPTACHLOR EPOXIDE	99	83	72	85	14
ENDOSULFAN I	75	82	71	76	6
GAMMA-CHLORDANE	71	77	66	71	6
ALPHA-CHLORDANE	73	69	63	68	5
DDE	98	91	84	91	7
DIELDRIN	104	78	71	84	18
ENDRIN	98	100	87	95	7
ENDOSULFAN II	80	86	72	79	7
DDD	173	148	130	150	22
ENDRIN ALDEHYDE	NS	NS	NS	N/A	N/A
DDT	124	108	95	109	15

NS:NOT SPIKED

N/A:NOT APLICABLE

STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

ABN_2

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

(SONICATION) PAGE: 1/2

	SSSN1	SSSN2	SSSN3	AVERAGE	STD
****SURR****					
2-FLUOROPHENOL	31	43	13	29	15
D5-PHENOL	33	46	21	33	13
D5-NITROBENZENE	39	60	38	46	12
2-FLUOROBIPHENYL	43	65	53	54	11
2,4,6-TRIBROMOPHENOL	54	100	70	75	23
D14-TERPHENYL	58	83	78	73	13
****COMPOUND****					
N-NITROSODIMETHYLAMINE	35	63	0	32	31
2-PICOLINE	25	31	14	23	9
3-METHYLCYCLOHEXYLAMINE	0	0	0	0	0
4-METHYLCYCLOHEXYLAMINE	NS	NS	NS	N/A	N/A
2-METHYLCYCLOHEXYLAMINE	NS	NS	NS	N/A	N/A
2-METHYLCYCLOHEXANONE	45	53	34	44	10
PHENOL	34	46	21	34	13
BIS(2-CHLOROISOPROPYL)ETHER	49	73	47	56	15
HEXACHLOROETHANE	44	71	47	54	15
O-TOLUIDINE	46	72	58	59	13
P-TOLUIDINE	NS	NS	NS	N/A	N/A
DI-N-PROPYLNITROSAMINE	49	49	53	50	2
NITROBENZENE	48	72	46	55	14
TOLUENE DI-ISOCYANATE	0	0	0	0	0
HEXACHLOROBUTADIENE	49	82	54	62	18
O-NITROTOLUENE	35	53	37	42	10
M-NITROTOLUENE	54	81	60	65	14
P-NITROTOLUENE	56	88	60	68	17
3,4-DIAMINOTOLUENE	NS	NS	NS	N/A	N/A
2,3-DIAMINOTOLUENE	0	0	0	0	0
2,4-DIAMINOTOLUENE	NS	NS	NS	N/A	N/A
2,6-DIAMINOTOLUENE	0	0	0	0	0
HEXACHLOROCYCLOPENTADIENE	36	53	42	44	9
2-CHLORONAPHTHALENE	40	68	55	54	14
2,6-DINITROTOLUENE	56	84	68	69	14
2,4-DINITROTOLUENE	50	79	61	63	15
1,2-DIPHENYLHYDRAZINE	43	67	53	55	12
4-BROMOPHENYLPHENYLETHER	68	115	83	89	24
A-BHC	66	103	79	83	19
B-BHC	71	120	88	93	25
G-BHC	61	99	71	77	20
D-BHC	64	110	80	84	23
PRONAMIDE	57	88	70	72	15
HEPTACHLOR	59	77	71	69	9

NS:NOT SPIKED

N/A:NOT APLICABLE

STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

ABN_2

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

(SONICATION) PAGE: 2/2

	SSSN1	SSSN2	SSSN3	AVERAGE	STD
ALDRIN	34	43	34	37	5
HEPTACHLOR EPOXIDE	58	88	69	71	15
ENDOSULFAN I	65	86	74	75	11
GAMMA-CHLORDANE	58	76	69	68	9
ALPHA-CHLORDANE	52	68	66	62	9
DDE	57	97	69	74	21
DIELDRIN	54	83	66	68	15
ENDRIN	74	110	81	88	19
ENDOSULFAN II	65	96	73	78	16
DDD	79	164	108	117	43
ENDRIN ALDEHYDE	NS	NS	NS	N/A	N/A
DDT	60	85	64	70	14

NS:NOT SPIKED

N/A:NOT APLICABLE

STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

ABN_4

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

(SONICATION) PAGE: 1/2

	SBSN1	SBSN2	SBSN3	AVERAGE	STD
****SURR****					
2-FLUOROPHENOL	48	44	45	46	2
D5-PHENOL	43	41	39	41	2
D5-NITROBENZENE	52	50	48	50	2
2-FLUOROBIPHENYL	67	56	44	56	12
2,4,6-TRIBROMOPHENOL	29	40	41	37	7
D14-TERPHENYL	85	82	90	86	4
****COMPOUND****					
N-NITROSODIMETHYLAMINE	51	60	0	37	33
2-PICOLINE	50	43	55	50	6
3-METHYLCYCLOHEXYLAMINE	0	0	0	0	0
4-METHYLCYCLOHEXYLAMINE	NS	NS	NS	N/A	N/A
2-METHYLCYCLOHEXYLAMINE	NS	NS	NS	N/A	N/A
2-METHYLCYCLOHEXANONE	68	60	52	60	8
PHENOL	41	38	35	38	3
BIS(2-CHLOROISOPROPYL)ETHER	72	63	59	65	6
HEXACHLOROETHANE	61	57	58	58	2
O-TOLUIDINE	22	16	38	25	11
P-TOLUIDINE	NS	NS	NS	N/A	N/A
DI-N-PROPYLNITROSAMINE	64	70	53	62	8
NITROBENZENE	68	65	59	64	4
TOLUENE DI-ISOCYANATE	0	0	0	0	0
HEXACHLOROBUTADIENE	63	66	67	65	2
O-NITROTOLUENE	48	48	40	45	4
M-NITROTOLUENE	69	72	69	70	2
P-NITROTOLUENE	70	71	67	69	2
3,4-DIAMINOTOLUENE	NS	NS	NS	N/A	N/A
2,3-DIAMINOTOLUENE	0	0	0	0	0
2,4-DIAMINOTOLUENE	NS	NS	NS	N/A	N/A
2,6-DIAMINOTOLUENE	0	0	0	0	0
HEXACHLOROCYCLOPENTADIENE	16	8	8	11	5
2-CHLORONAPHTHALENE	46	54	53	51	5
2,6-DINITROTOLUENE	69	63	54	62	8
2,4-DINITROTOLUENE	53	51	44	49	4
1,2-DIPHENYLHYDRAZINE	53	52	50	51	2
4-BROMOPHENYLPHENYLETHER	75	80	79	78	3
A-BHC	67	73	69	70	3
B-BHC	71	78	76	75	4
G-BHC	56	68	61	62	6
D-BHC	55	64	57	58	5
PRONAMIDE	74	71	65	70	5
HEPTACHLOR	65	68	56	63	7

NS:NOT SPIKED

N/A:NOT APLICABLE

STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

ABN_4

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

(SONICATION) PAGE: 2/2

	SBSN1	SBSN2	SBSN3	AVERAGE	STD
ALDRIN	44	47	40	44	4
HEPTACHLOR EPOXIDE	54	63	56	58	5
ENDOSULFAN I	64	68	56	63	6
GAMMA-CHLORDANE	52	62	49	54	7
ALPHA-CHLORDANE	42	51	39	44	6
DDE	49	55	40	48	8
DIELDRIN	52	59	47	53	6
ENDRIN	77	79	56	71	13
ENDOSULFAN II	65	62	49	59	9
DDD	50	62	44	52	9
ENDRIN ALDEHYDE	NS	NS	NS	N/A	N/A
DDT	40	41	23	34	10

NS:NOT SPIKED

N/A:NOT APLICABLE

STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

ABN_6

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

(SOXHLET) PAGE: 1/2

	FASX1	FASX2	FASX3	AVERAGE	STD
****SURR****					
2-FLUOROPHENOL	53	45	50	49	4
D5-PHENOL	55	51	50	52	3
D5-NITROBENZENE	68	60	64	64	4
2-FLUOROBIPHENYL	68	64	69	67	3
2,4,6-TRIBROMOPHENOL	76	77	81	78	3
D14-TERPHENYL	83	74	81	79	5
****COMPOUND****					
N-NITROSODIMETHYLAMINE	98	55	88	80	22
2-PICOLINE	45	52	38	45	7
3-METHYLCYCLOHEXYLAMINE	0	0	0	0	0
4-METHYLCYCLOHEXYLAMINE	NS	NS	NS	N/A	N/A
2-METHYLCYCLOHEXYLAMINE	NS	NS	NS	N/A	N/A
2-METHYLCYCLOHEXANONE	83	73	71	76	7
PHENOL	51	49	47	49	2
BIS(2-CHLOROISOPROPYL)ETHER	79	78	76	77	2
HEXACHLOROETHANE	93	85	81	86	6
O-TOLUIDINE	106	96	84	95	11
P-TOLUIDINE	NS	NS	NS	N/A	N/A
DI-N-PROPYLNITROSAMINE	82	73	70	75	6
NITROBENZENE	87	74	76	79	7
TOLUENE DI-ISOCYANATE	0	0	0	0	0
HEXACHLOROBUTADIENE	97	87	89	91	5
O-NITROTOLUENE	64	58	57	60	4
M-NITROTOLUENE	99	93	91	94	5
P-NITROTOLUENE	103	95	92	96	6
3,4-DIAMINOTOLUENE	NS	NS	NS	N/A	N/A
2,3-DIAMINOTOLUENE	33	0	0	11	19
2,4-DIAMINOTOLUENE	NS	NS	NS	N/A	N/A
2,6-DIAMINOTOLUENE	86	51	0	46	43
HEXACHLOROCYCLOPENTADIENE	64	48	46	53	10
2-CHLORONAPHTHALENE	77	77	70	75	4
2,6-DINITROTOLUENE	88	85	86	86	1
2,4-DINITROTOLUENE	84	77	78	79	4
1,2-DIPHENYLHYDRAZINE	74	70	74	73	2
4-BROMOPHENYLPHENYLETHER	124	121	127	124	3
A-BHC	107	105	109	107	2
B-BHC	135	132	135	134	2
G-BHC	104	108	110	108	3
D-BHC	116	112	120	116	4
PRONAMIDE	91	95	92	92	2
HEPTACHLOR	94	96	96	95	1

NS:NOT SPIKED

N/A:NOT APLICABLE

STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

ABN_6

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

(SOXHLET) PAGE: 2/2

	FASX1	FASX2	FASX3	AVERAGE	STD
ALDRIN	86	87	86	86	1
HEPTACHLOR EPOXIDE	103	102	101	102	1
ENDOSULFAN I	84	84	86	85	1
GAMMA-CHLORDANE	69	70	71	70	1
ALPHA-CHLORDANE	68	68	69	68	1
DDE	93	103	95	97	5
DIELDRIN	96	95	90	94	3
ENDRIN	113	113	115	114	1
ENDOSULFAN II	89	89	95	91	3
DDD	156	186	176	173	15
ENDRIN ALDEHYDE	NS	NS	NS	N/A	N/A
DDT	120	111	118	117	5

NS:NOT SPIKED

N/A:NOT APLICABLE

STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

ABN_7

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

(SOXHLET) PAGE: 1/2

	SSSX1	SSSX2	SSSX3	AVERAGE	STD
****SURR****					
2-FLUOROPHENOL	53	55	54	54	1
D5-PHENOL	54	52	56	54	2
D5-NITROBENZENE	60	51	56	56	5
2-FLUOROBIPHENYL	70	65	71	69	3
2,4,6-TRIBROMOPHENOL	70	65	86	74	11
D14-TERPHENYL	78	70	82	77	6
****COMPOUND****					
N-NITROSODIMETHYLAMINE	86	0	91	59	51
2-PICOLINE	58	69	62	63	6
3-METHYLCYCLOHEXYLAMINE	0	0	0	0	0
4-METHYLCYCLOHEXYLAMINE	NS	NS	NS	N/A	N/A
2-METHYLCYCLOHEXYLAMINE	NS	NS	NS	N/A	N/A
2-METHYLCYCLOHEXANONE	78	76	79	78	2
PHENOL	58	54	58	57	2
BIS(2-CHLOROISOPROPYL)ETHER	77	65	70	71	6
HEXACHLOROETHANE	96	80	80	85	9
O-TOLUIDINE	94	82	86	87	6
P-TOLUIDINE	NS	NS	NS	N/A	N/A
DI-N-PROPYLNITROSAMINE	83	66	68	72	9
NITROBENZENE	71	63	67	67	4
TOLUENE DI-ISOCYANATE	0	0	0	0	0
HEXACHLOROBUTADIENE	91	83	86	87	4
O-NITROTOLUENE	56	56	53	55	1
M-NITROTOLUENE	91	92	99	94	4
P-NITROTOLUENE	96	94	97	96	2
3,4-DIAMINOTOLUENE	NS	NS	NS	N/A	N/A
2,3-DIAMINOTOLUENE	0	0	0	0	0
2,4-DIAMINOTOLUENE	NS	NS	NS	N/A	N/A
2,6-DIAMINOTOLUENE	0	0	0	0	0
HEXACHLOROCYCLOPENTADIENE	18	23	15	19	4
2-CHLORONAPHTHALENE	65	69	82	72	9
2,6-DINITROTOLUENE	81	74	81	79	4
2,4-DINITROTOLUENE	69	66	69	68	2
1,2-DIPHENYLHYDRAZINE	64	60	69	64	5
4-BROMOPHENYLPHENYLETHER	107	95	115	106	10
A-BHC	96	89	107	97	9
B-BHC	110	101	125	112	12
G-BHC	94	90	106	96	9
D-BHC	98	92	110	100	9
PRONAMIDE	86	77	87	83	5
HEPTACHLOR	76	71	72	73	3

NS:NOT SPIKED

N/A:NOT APLICABLE

STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

ABN_7

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

(SOXHLET) PAGE: 2/2

	SSSX1	SSSX2	SSSX3	AVERAGE	STD
ALDRIN	37	22	22	27	8
HEPTACHLOR EPOXIDE	112	93	100	102	10
ENDOSULFAN I	103	88	96	96	8
GAMMA-CHLORDANE	76	63	69	69	7
ALPHA-CHLORDANE	65	53	58	59	6
DDE	93	78	95	89	9
DIELDRIN	94	88	95	92	4
ENDRIN	139	106	118	121	17
ENDOSULFAN II	114	93	98	102	11
DDD	107	41	143	97	52
ENDRIN ALDEHYDE	NS	NS	NS	N/A	N/A
DDT	93	72	46	70	24

NS:NOT SPIKED

N/A:NOT APLICABLE

STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

ABN_S

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

(SOXHLET) PAGE: 1/2

	SBSX1	SBSX2	SBSX3	AVERAGE	STD
****SURR****					
2-FLUOROPHENOL	18	34	32	28	9
D5-PHENOL	18	31	33	27	8
D5-NITROBENZENE	28	44	54	42	13
2-FLUOROBIPHENYL	29	46	39	38	9
2,4,6-TRIBROMOPHENOL	29	41	42	37	7
D14-TERPHENYL	37	55	57	50	11
****COMPOUND****					
N-NITROSODIMETHYLAMINE	31	52	34	39	11
2-PICOLINE	20	40	40	34	11
3-METHYLCYCLOHEXYLAMINE	0	0	0	0	0
4-METHYLCYCLOHEXYLAMINE	NS	NS	NS	N/A	N/A
2-METHYLCYCLOHEXYLAMINE	NS	NS	NS	N/A	N/A
2-METHYLCYCLOHEXANONE	29	54	63	49	18
PHENOL	15	27	31	24	8
BIS(2-CHLOROISOPROPYL)ETHER	33	54	55	47	12
HEXACHLOROETHANE	34	58	45	46	12
O-TOLUIDINE	0	0	0	0	0
P-TOLUIDINE	NS	NS	NS	N/A	N/A
DI-N-PROPYLNITROSAMINE	28	51	41	40	11
NITROBENZENE	35	57	69	53	17
TOLUENE DI-ISOCYANATE	0	0	0	0	0
HEXACHLOROBUTADIENE	46	80	80	69	20
O-NITROTOLUENE	24	39	46	36	11
M-NITROTOLUENE	38	56	57	50	11
P-NITROTOLUENE	37	58	64	53	14
3,4-DIAMINOTOLUENE	NS	NS	NS	N/A	N/A
2,3-DIAMINOTOLUENE	0	0	0	0	0
2,4-DIAMINOTOLUENE	NS	NS	NS	N/A	N/A
2,6-DIAMINOTOLUENE	0	0	0	0	0
HEXACHLOROCYCLOPENTADIENE	0	0	0	0	0
2-CHLORONAPHTHALENE	5	37	33	25	18
2,6-DINITROTOLUENE	25	43	43	37	10
2,4-DINITROTOLUENE	18	36	36	30	10
1,2-DIPHENYLHYDRAZINE	31	51	51	45	11
4-BROMOPHENYLPHENYLETHER	70	100	93	87	16
A-BHC	57	86	81	75	16
B-BHC	62	107	101	90	25
G-BHC	53	86	76	72	17
D-BHC	53	92	84	76	20
PRONAMIDE	34	52	58	48	12
HEPTACHLOR	28	45	37	37	8

NS:NOT SPIKED

N/A:NOT APLICABLE

STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

ABN_B

AVERAGE & STANDARD-DEVIATION OF SURROGATES & COMPOUNDS.

(SOXHLET) PAGE: 2/2

	SBSX1	SBSX2	SBSX3	AVERAGE	STD
ALDRIN	27	43	47	39	11
HEPTACHLOR EPOXIDE	36	70	70	59	19
ENDOSULFAN I	43	64	66	58	13
GAMMA-CHLORDANE	32	44	45	40	7
ALPHA-CHLORDANE	24	35	38	32	7
DDE	34	58	54	49	13
DIELDRIN	34	69	69	57	20
ENDRIN	58	74	80	71	11
ENDOSULFAN II	45	72	74	64	16
DDD	50	87	92	76	23
ENDRIN ALDEHYDE	NS	NS	NS	N/A	N/A
DDT	17	22	10	16	6

NS:NOT SPIKED

N/A:NOT APLICABLE

STD=@SQRT((@SUM((X1^2),(X2^2),(X3^2))-((@SUM(X1,X2,X3))^2/N))/(N-1))

APPENDIX B

Contains chromatograms representing each preparation/analysis combination.

Raw file.....NAI$DIR:[DATA.COMMJH1116012.RAW;1
Sample name.....OC SURROGATE 1:40
Acq. date.....17-NOV-1989 00:01:55

Method file.....NAI$DIR:[DATA.COMMJH8081CAL1.MET;3
Device.....Channel BA
Acq. run time.....34.995 min

Author..... FI
Instrument..... IV HP5880
Column type..... DB-608
length..... A
diameter..... A
Stationary phase.... A
Mobile phase..... A
Detector..... A
Notes..... CLP PEST/PCB ANALYSIS,1 UL INJ.

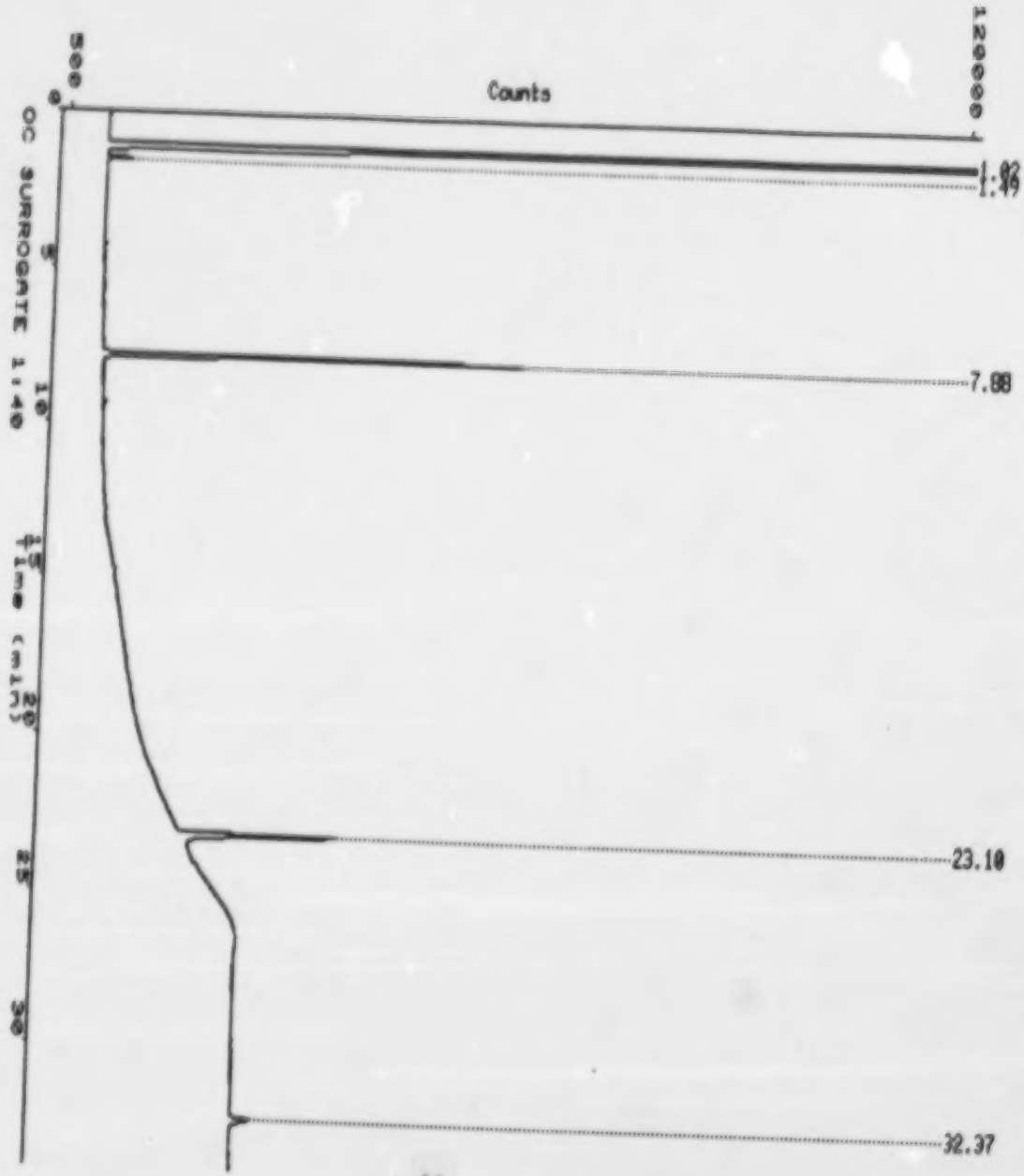
Analysis type.....EXTERNAL STANDARD A/D range.....1 volt(s)

PEAK LIST

Calibration sample name: AVE

Peak name	R.T.(min)	NG/ML	Peak Area	Peak Ht.	Bl
	1.024		1990498	338530	BB
	1.487		10309	3116	BB
	4.299		844	203	BB
TETRA-CL-M-XY	7.876	50.603	257668	55431	BB
	9.384		1586	374	BB
	23.098		142561	20312	BB
DECACHLOROBIP	32.369	3.3362	24254	2365	BB

Data file: MAIN$DIR:[DATA.COMMON]1116012
Report: 41673
Acquired: 17-NOV-1989 00:01:55
Time range: 0.00-24.00



Raw file.....NAI$DIR:[DATA.COMM]H1116013.RAW;1
Sample name.....OC MATRIX 1:40
Acq. date.....17-NOV-1989 00:45:05

Method file.....NAI$DIR:[DATA.COMM]H8081CAL1.MET;3
Device.....Channel 8A
Acq. run time.....34.995 min

Author..... ET
Instrument..... IV HP5880
Column type..... DB-608
length..... *
diameter..... *
Stationary phase.... *
Mobile phase..... *
Detector..... *
Notes..... CLP PEST/PCB ANALYSIS,1 UL INJ.

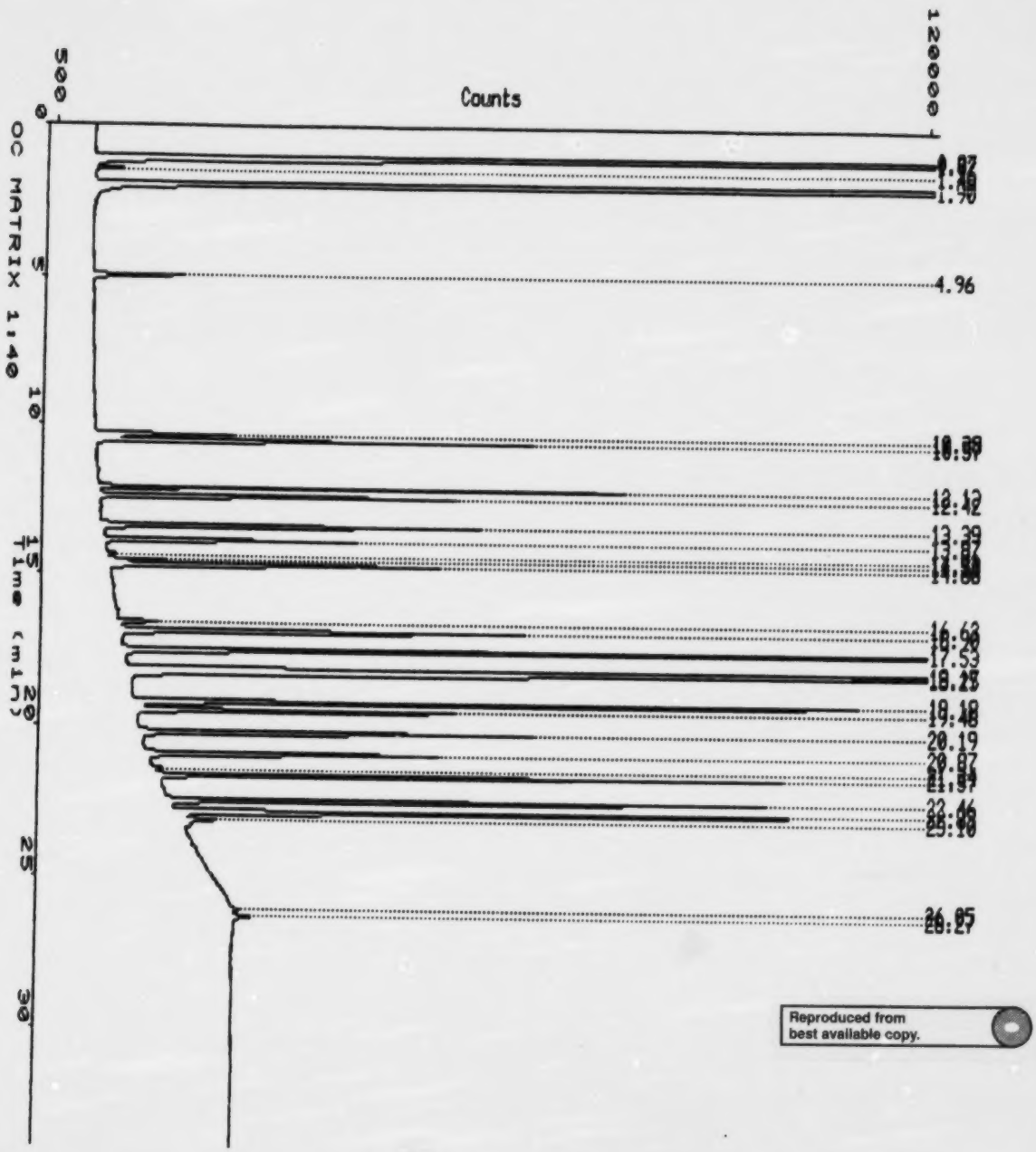
Analysis type.....EXTERNAL STANDARD A/D range.....1 volt(s)

PEAK LIST

Calibration sample name: AVE

Peak name	R.T.(min)	NG/ML	Peak Area	Peak Ht.	Bl
	0.967		192104	186502	BV
	1.015		2539777	422700	VE
	1.478		12416	3572	EB
HEXACHLOROETH	1.898	7.70E+02	5601053	1054746	BB
2 chloronaphthalene	4.961	586	59743	12078	BB
4-BR-DIPHENYL	10.382	1.58E+03	111830	18511	BV
A-BHC	10.570	78.330	260527	59710	VB
G-BHC	12.130	98.247	320284	71729	BB
B-BHC	12.418	85.129	232657	48906	BB
HEPTACHLOR	13.391	54.414	292473	51596	BB
D-BHC	13.868	44.013	151140	34615	BB
	14.326		5044	1001	BV
	14.523		36766	7674	VV
ALDRIN	14.683	55.385	257649	45017	VB
	16.259		1253	271	BB
	16.621		31772	5399	BV
HEPT.EPOXIDE	16.900	66.927	312014	55286	VB
G-CHLORDANE	17.529	1.36E+02	712964	122960	BB
CMPD 2	18.169	165	735741	126394	BV
A-CHLORDANE	18.248	~~1.32E+02~~ 132	585862	110290	VB
DDE	19.182	1.51E+02	511722	99155	BV
DIELDRIN	19.457	65.002	244601	43541	VB
	20.185		287814	53708	BB
ENDRIN	20.869	70.034	222007	39928	BB
DDD	21.338	2.4560	7061	1196	BV
ENDOSULFAN II	21.567	1.15E+02	477713	85335	VB
DDT	22.465	1.29E+02	430162	81778	BB
ENDRIN ALDEHY	22.835	1.40E+02	494312	83947	BE
	23.096		34060	4699	EV
	23.278		6328	1025	EB

Data file: NAI$DIR:[DATA.COMM]H1116013
Report: 41684
Acquired: 17-NOV-1989 00:45:05
Time range: 0.00-34.00



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Raw file.....NAI$DIR:[DATA.COMMJH1116016.RAW;1
Sample name.....CMS-1
Acq. date.....17-NOV-1989 02:54:34

Method file.....NAI$DIR:[DATA.COMMJH8081CAL1.MET;3
Device.....Channel 8A
Acq. run time.....34.995 min

Author..... FI
Instrument..... IV HP5880
Column type..... DB-608
length..... *
diameter..... *
Stationary phase.... *
Mobile phase..... *
Detector..... *
Notes..... CLP PEST/PCB ANALYSIS,1 UL INJ.

Analysis type.....EXTERNAL STANDARD A/D range.....1 volt(s)

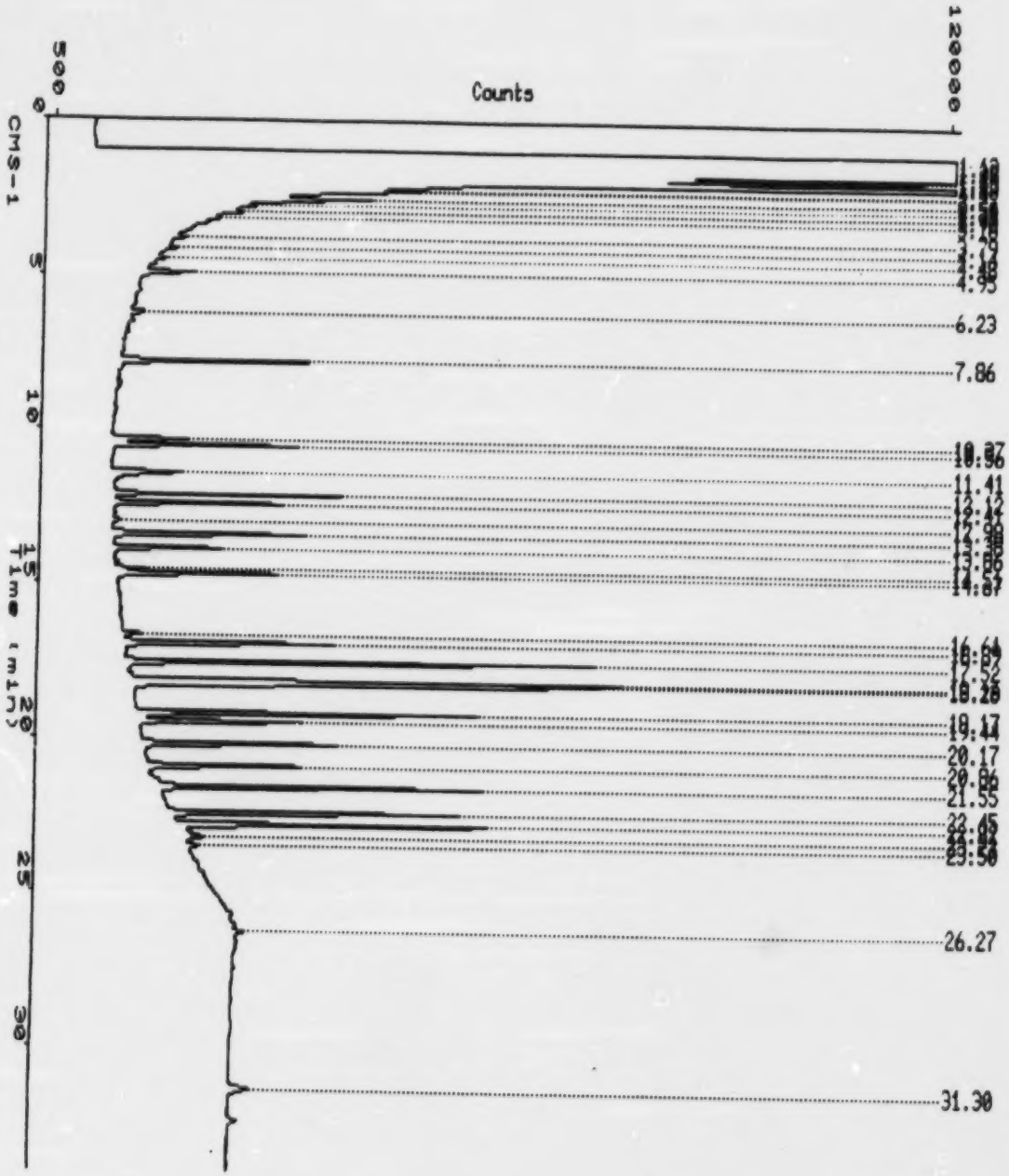
PEAK LIST

Calibration sample name: AVE

Peak name	R.T.(min)	NG/ML	Peak Area	Peak Ht.	Bl
	1.134		*******	1030519	BV
	1.383		3124027	496709	VV
	1.549		1310952	200019	VV
	1.746		719350	104952	VV
Dichlorodifluoromethane	- 1.880	677	4924977	995765	VE
	2.220		207816	31348	EV
	2.272		298278	34356	EV
	2.543		311830	28216	EV
	2.758		107249	11367	VV
	2.964		96499	9032	VV
	3.174		30436	5116	VV
	3.288		20517	2961	VB
	3.794		7054	1342	BB
	4.139		5448	1471	BB
	4.475		5703	1290	BB
2 Chloromethylether	- 4.947	337	34364	6347	BB
	6.231		13326	1604	BB
	6.899		1743	402	BB
tetrachloroethylene	- 7.859	24	121602	24810	BB
	8.554		1788	368	BV
	8.672		2347	426	VB
	9.387		1227	231	BB
4,82-Dipropoxy	-10.370	832	59356	9763	BV
A-BHC	-10.557	34	113631	24388	VB
	11.414		72884	8842	BB
G-BHC	12.116	44.347	144571	30240	BV
B-BHC	12.407	41.696	113954	22136	VE
	12.768		1923	287	EB
	12.976		5667	820	BB
HEPTACHLOR	13.379	27.932	150135	25438	BB

D-BHC	13.856	19.726	67738	13871	BB
	14.317		2351	468	BB
	14.510		18242	3706	BV
ALDRIN	14.672	27.515	128001	20837	VB
	16.609		14986	2364	BV
HEPT.EPOXIDE	16.887	34.689	161722	27673	VB
G-CHLORDANE	17.516	69.332	364477	61896	BB
Endo I	18.156	85	376967	63231	BV
A-CHLORDANE	18.233	~~66.020~~ 66	293525	54996	VB
DDE	19.170	72.461	244991	45026	BV
DIELDRIN	19.444	34.288	129027	21377	VB
	20.174		144064	25710	BB
ENDRIN	20.856	37.171	117832	20008	BB
ENDOSULFAN II	21.555	62.767	261360	43180	BB
DDT	22.452	63.987	213908	38413	BV
ENDRIN ALDEHY	22.823	73.187	258422	41403	VE
	23.223		33171	2788	EV
	23.501		9949	1543	VB
	25.696		17673	1020	BV
	26.045		9055	703	VV
	26.266		8807	1239	VB
	26.581		2091	317	BV
	26.761		1901	283	VB
	31.297		29225	2562	BB

Data file: NAI$DIR:[DATA.COMM]H1116016
Report: 41711
Acquired: 17-NOV-1989 02:54:34
Time range: 0.00-34.00



Raw file.....NAI$DIR:[DATA.COMMJH1116025.RAW;1
Sample name.....FA-1
Acq. date.....17-NOV-1989 09:22:43

Method file.....NAI$DIR:[DATA.COMMJH8081CAL1.MET;3
Device.....Channel 8A
Acq. run time.....34.995 min

Author..... FT
Instrument..... IV HP5880
Column type..... DB-608
length..... *
diameter..... *
Stationary phase.... *
Mobile phase..... *
Detector..... *
Notes..... CLP PEST/PCB ANALYSIS,1 UL INJ.

Analysis type.....EXTERNAL STANDARD A/D range.....1 volt(s)

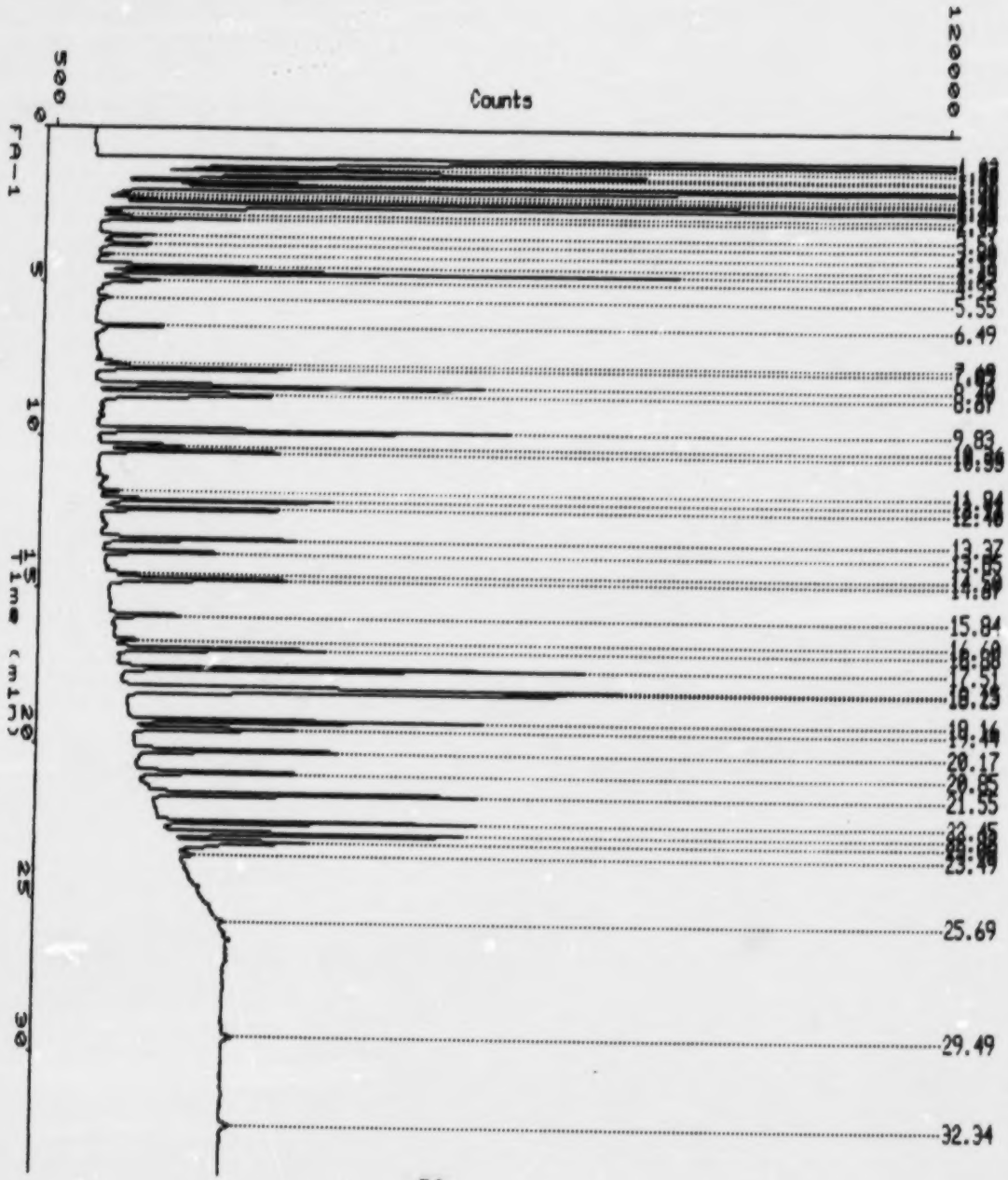
PEAK LIST

Calibration sample name: AVE

Peak name	R.T.(min)	NG/ML	Peak Area	Peak Ht.	Bl
	1.022		3458703	542760	BE
	1.172		88222	19612	EV
	1.288		149208	36492	EV
	1.479		460204	67993	VV
	1.573		161732	43666	VV
	1.764		141697	29003	VV
	-1.883	532	3867379	997057	VE
	2.113		29699	3593	EV
	2.284		20719	5372	EV
	2.357		27871	7337	VV
	2.472		1319995	278443	VE
	2.787		16403	2639	EV
	2.954		76422	18351	VB
	3.513		41362	7148	BV
	3.798		40367	6776	VV
	4.139		6857	1659	VB
	4.487		112215	20897	BV
	4.669		337274	77277	VV
	-4.947	440	44843	7363	VB
	5.554		9876	1697	BB
	6.486		35911	8376	BB
	7.461		1606	377	BB
	7.688		16421	2932	BV
	-7.849	24	123751	25566	VB
	8.396		275047	51366	BV
	8.675		222519	23071	VB
	9.378		3634	573	BB
	9.828		271280	54817	BB
	10.156		749	212	BB
	-10.362	9.4	65201	10859	BV

	10.548	33	108629	23989	VB
	11.138		1045	215	BB
	11.424		9609	1128	BB
	11.837		12590	2467	BV
	12.107	46	149658	30384	VV
	12.397		112803	23291	VB
HEPTACHLOR	13.370	28.122	151155	25533	BB
D-BHC	13.847	20.074	68935	14646	BB
	14.304		2008	424	BB
	14.501		18826	3850	BV
ALDRIN	14.668	35.186	163686	23305	VB
	15.845		48208	8862	BB
	16.602		16471	2765	BV
HEPT.EPOXIDE	16.879	34.318	159990	27594	VB
G-CHLORDANE	17.507	68.159	358311	61926	BB
	18.148		368875	64392	BV
A-CHLORDANE	18.227	69.929	310905	57378	VB
DDE	19.161	73.514	248552	47190	BV
DIELDRIN	19.436	33.524	126151	21484	VB
	20.165		144972	26708	BB
ENDRIN	20.850	38.567	122256	20617	BB
ENDOSULFAN II	21.548	58.574	243904	43743	BB
DDT	22.447	67.040	224115	42174	BV
ENDRIN ALDEHY	22.818	67.264	237509	39705	VV
	23.078		162455	17885	VE
	23.495		13458	2143	EB
	24.533		4537	578	BB
	25.690		5590	891	BB
	26.046		2822	464	BB
	26.263		5217	827	BB
	26.579		1327	243	BB
	29.493		10892	1207	BB
DECACHLOROBIP	32.340	1.6813	12223	1237	BB

Data file: NAI$DIR:[DATA.COMM]H1116025
Report: 41700
Acquired: 17-NOV-1989 09:22:43
Time range: 0.00-34.00



Raw file.....NAI$DIR:[DATA.COMMJH1116034.RAW;1
Sample name.....SS-1
Acq. date.....17-NOV-1989 15:51:01

Method file.....NAI$DIR:[DATA.COMMJH6081CAL1.MET;3
Device.....Channel 8A
Acq. run time.....34.995 min

Author..... ET
Instrument..... IV HP5880
Column type..... DB-608
length..... *
diameter..... *
Stationary phase.... *
Mobile phase..... *
Detector..... *
Notes..... CLP PEST/PCB ANALYSIS.1 UL INJ.

Analysis type.....EXTERNAL STANDARD A/D range.....1 volt(s)

PEAK LIST

Calibration sample name: AVE

Peak name	R.T.(min)	NG/ML	Peak Area	Peak Ht.	Bl
	1.008		2424374	392624	BE
	1.205		47278	14608	EV
	1.311		93854	28892	EB
	1.446		89141	26388	BB
	1.599		49497	20259	BB
	1.807		112020	22084	BV
HEXACHLOROETH	1.913	5.16E+02	3752816	999029	VB
	2.143		3918	1170	BV
	2.263		17830	5247	VV
	2.325		36615	7816	VE
	2.432		5687	1240	EV
	2.586		20798	4157	VB
	2.841		18944	3034	BE
	2.999		2604	633	EV
	3.071		2539	769	VB
	3.252		43448	6728	BB
	3.634		4244	1049	BB
	3.905		1132	359	BV
	4.005		2946	689	VB
	4.191		19967	4962	BV
	4.327		13951	3274	VV
	4.558		13038	2602	VB
	4.840		100732	27141	BV
2CHLORONAPHTH	5.001	4.59E+02	46835	8712	VV
	5.130		13093	2900	VV
	5.273		4717	1064	VB
	5.458		3166	750	BB
	5.638		6582	1135	BB
	5.990		13458	1607	BB
	6.235		2950	647	BB

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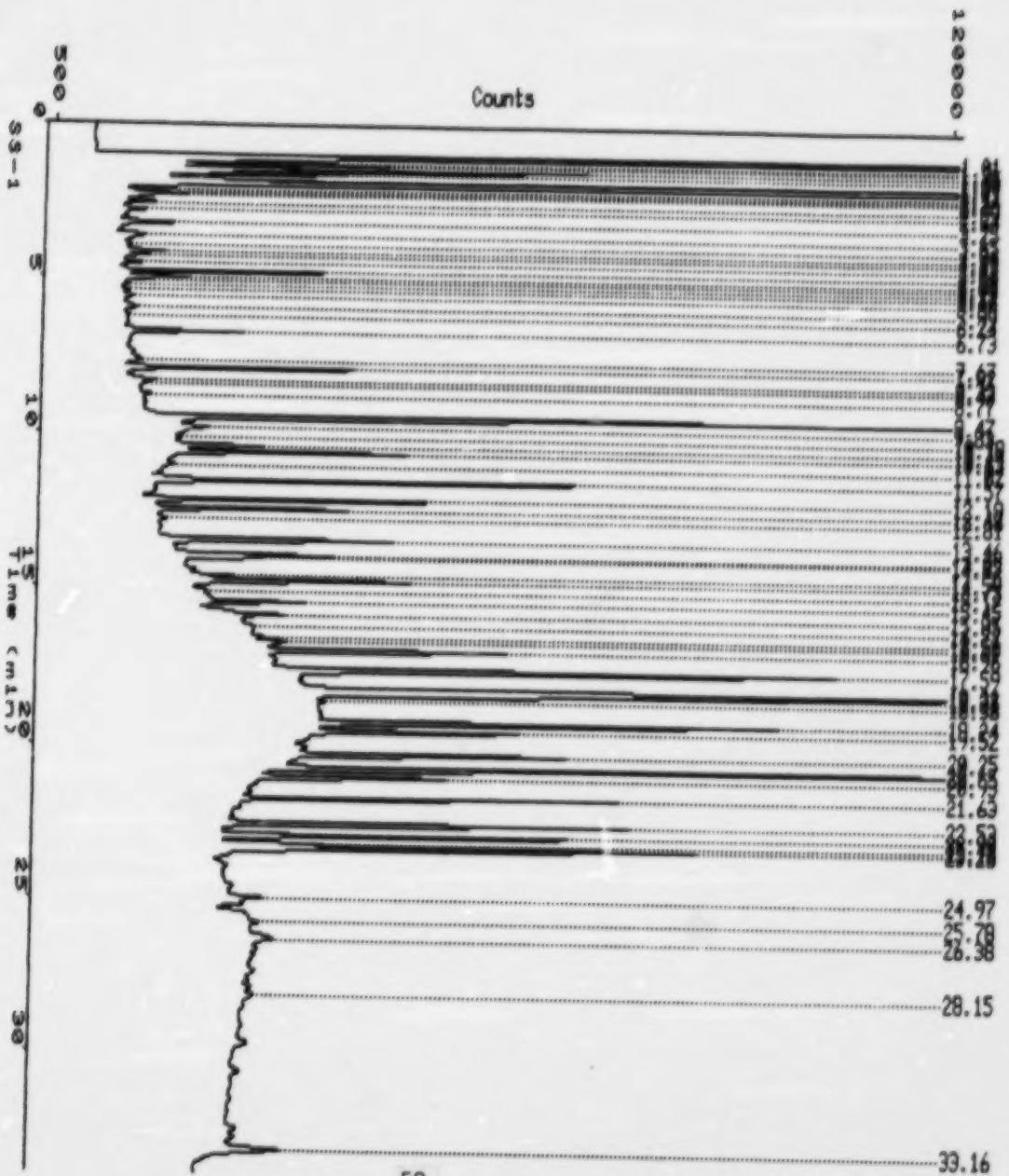
	6.728		70354	15283	BB
	7.072		788	227	BB
	7.398		8477	969	BV
	7.562		8807	1489	VV
	7.672		15012	1914	VB
TETRA-CL-M-XY	7.924	28.786	146579	30306	BB
	8.320		19633	3196	BV
	8.434		10496	1753	VV
	8.604		2952	484	VV
	8.772		6575	1279	VB
	9.055		1862	396	BB
	9.468		553895	117801	BE
	9.833		46338	4440	EB
	10.185		3873	688	BV
4-BR-DIPHENYL	10.437	1.06E+03	75470	12304	VV
A-BHC	10.627	46.592	154964	31775	VE
	11.025		10121	1329	EB
	11.567		259891	56172	BB
G-BHC	12.191	56.511	184225	37644	BV
B-BHC	12.480	49.417	135056	26388	VE
	12.809		18121	1589	EV
	13.060		6036	493	VB
HEPTACHLOR	13.456	34.788	186986	30334	BV
D-BHC	13.928	30.746	105583	20776	VV
	14.020		43707	10534	VB
	14.396		3810	692	BB
	14.585		27562	5463	BV
ALDRIN	14.750	39.377	183184	29352	VB
	15.115		12312	1698	BV
	15.446		101183	14227	VB
	15.849		78986	8578	BE
	16.221		10073	774	EB
	16.527		5153	1095	BV
	16.690		32116	3752	VV
HEPT.EPOXIDE	16.964	38.159	177899	32081	VB
G-CHLORDANE	17.593	80.067	420914	73116	BB
A-CHLORDANE	18.224	1.37E+02	610078	87130	BV
ENDOSULFAN I	18.314	71.179	315324	63687	VE
	18.578		7997	1260	EB
	19.047		2749	396	BV
DDE	19.243	93.628	316557	61775	VV
DIELDRIN	19.521	41.917	157732	27448	VB
	20.017		20399	2117	BV
	20.246		235829	37393	VV
	20.654		465901	94448	VB
ENDRIN	20.934	42.567	134938	24685	BB
DDD	21.392	0.94887	2728	517	BB
ENDOSULFAN II	21.630	65.283	271838	49890	BB
	22.285		1299	312	BB
DDT	22.526	83.742	279949	53558	BB
ENDRIN ALDEHY	22.899	74.164	261872	45649	BV
	23.157		64459	13939	VV
	23.280		474570	63597	VB
	23.887		13269	1064	BB
	24.593		15624	1266	BV
	24.974		56557	5433	VV
	25.147		23150	3251	VB
	25.775		8150	1243	BB
	26.321		37861	2664	BV
	26.653		6832	905	VV

	26.854		3578	593	VB
	27.379		12870	1058	BV
	27.694		3485	588	VB
	27.905		8211	1035	BV
	28.155		15545	1345	VB
	29.679		17476	1402	BB
	30.629		12570	1189	BB
DECACHLOROBIP	32.494	1.4845	10792	1189	BB
	33.156		93178	8318	BB

Data file: MAI$DIR:[DATA.COMM]H1116034
Report: 41890
Acquired: 17-NOV-1989 15:51:01
Time range: 0.00-34.00



Raw file.....NAI$DIR:[DATA.COMMJH1116043.RAW;1
Sample name.....SB-1
Acq. date.....17-NOV-1989 22:19:18

Method file.....NAI$DIR:[DATA.COMMJH8081CAL1.MET;3
Device.....Channel 8A
Acq. run time.....34.995 min

Author..... FT
Instrument..... IV HP5880
Column type..... DB-608
length..... A
diameter..... A
Stationary phase.... A
Mobile phase..... A
Detector..... A
Notes..... CLP PEST/PCB ANALYSIS,1 UL INJ.

Analysis type.....EXTERNAL STANDARD A/D range.....1 volt(s)

PEAK LIST

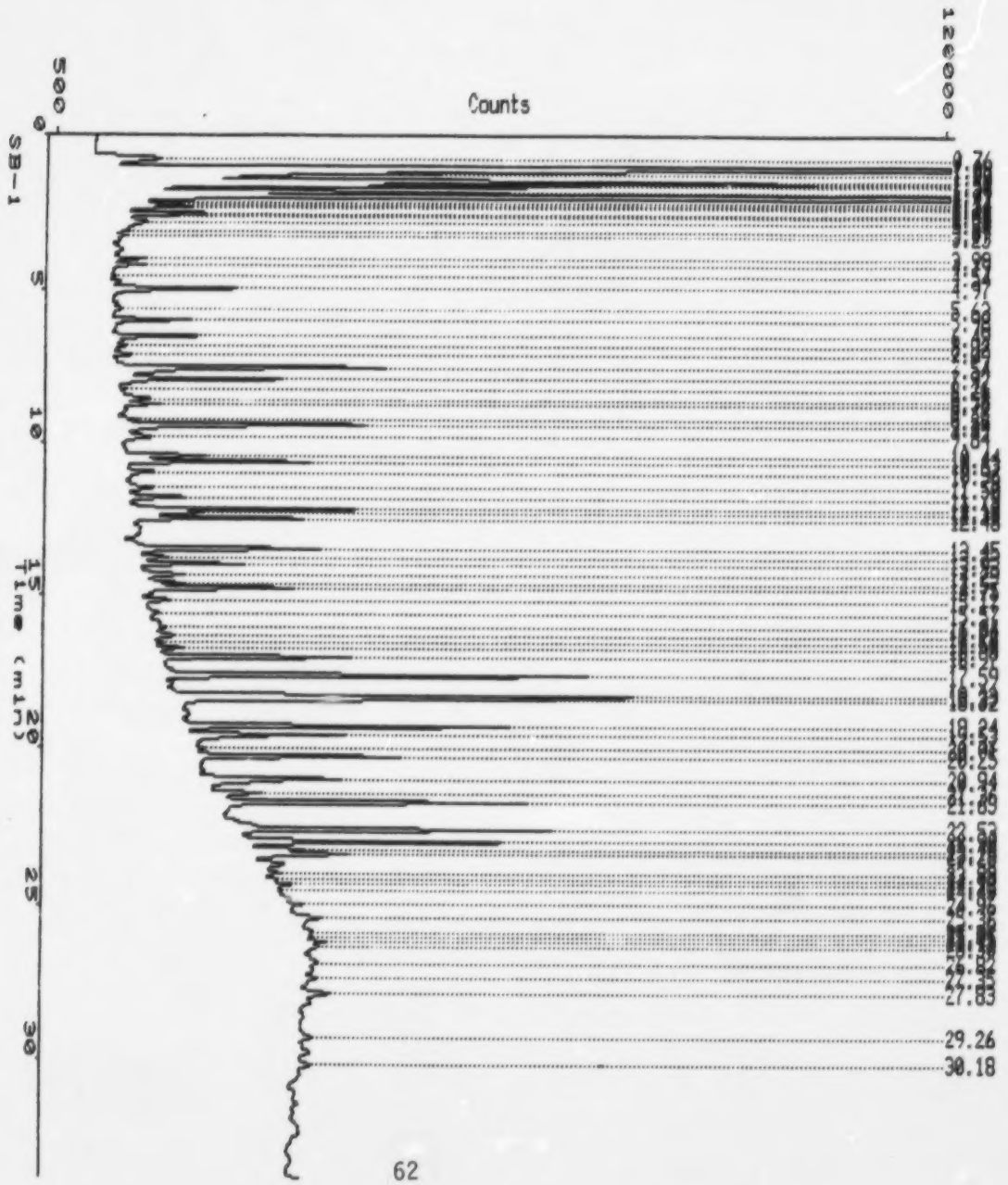
Calibration sample name: AVE

Peak name	R.T.(min)	NG/ML	Peak Area	Peak Ht.	B1
	0.762		106732	8299	BV
	1.034		3516946	543042	VE
	1.200		168396	30494	EV
	1.293		97654	23894	EV
	1.437		341982	88067	VV
	1.497		382999	91787	VV
	1.595		292520	65724	VV
	1.788		283614	54165	VV
HEXACHLOROETH	1.913	4.29E+02	3120127	767163	VE
	2.142		39457	6485	EV
	2.238		49392	9281	EV
	2.313		64479	10217	EV
	2.509		52266	12212	VV
	2.577		36237	8468	VV
	2.802		63919	4391	VV
	3.072		8708	1745	VV
	3.225		5554	1450	VB
	3.994		19889	4091	BV
	4.186		19059	4045	VE
	4.399		1239	319	EB
	4.545		2634	581	BB
	4.747		9645	1253	BV
	4.969	1.69	108905	16455	VB
	5.460		3273	680	BV
	5.630		8936	1207	VB
	5.985		49985	10169	BB
	6.490	59	59942	11146	BE
	6.660		3661	781	EV
	6.819		6825	1305	EB
	7.093		13586	2252	BB

	7.540		255269	35815	BV
TETRA-CL-M-XY	7.922	25.447	129578	21588	VE
	8.259		4493	863	EV
	8.384		4527	904	EV
	8.563		37293	4200	VV
	8.723		34575	5516	VE
	8.912		8217	922	EB
	9.222		14148	2319	BV
	9.389		225977	32614	VE
	9.842		40539	3810	EB
4-BR-DIPHENYL	10.438	8.77E+02	62301	10531	BV
A-BHC	10.626	36.274	120647	24438	VB
	10.965		18020	3296	BB
	11.503		21045	2911	BB
	11.792		44513	7334	BB
G-BHC	12.190	45.526	148416	29894	BV
	12.301		54558	9527	VV
B-BHC	12.477	42.395	115865	22698	VB
HEPTACHLOR	13.455	33.018	177473	25288	BE
	13.728		29136	4297	EV
D-BHC	13.927	19.422	66694	13873	VB
	14.287		41623	5222	BV
	14.571		46235	5045	VV
ALDRIN	14.751	28.000	130258	19943	VE
	14.988		5992	1058	EB
	15.170		20936	3393	BB
	15.569		8787	1126	BB
	15.870		7573	1163	BV
	16.035		15090	1623	VV
	16.280		23135	2543	VB
	16.511		3880	848	BB
	16.683		21544	3336	BV
HEPT.EPOXIDE	16.966	34.133	159127	25513	VB
	17.254		662	202	BB
	17.397		3697	771	BV
G-CHLORDANE	17.593	62.891	330618	56428	VB
	17.850		5159	726	BB
A-CHLORDANE	18.231	81.085	360506	60439	BV
ENDOSULFAN I	18.317	60.086	266179	50512	VB
	18.886		1789	437	BB
DDE	19.243	66.059	223346	43361	BB
DIELDRIN	19.528	43.831	164936	20697	BB
	20.012		3852	728	BV
	20.247		149006	27211	VE
	20.439		1716	406	EB
	20.701		1428	338	BB
ENDRIN	20.936	45.734	144976	18528	BV
DDD	21.361	15.363	44168	6418	VV
ENDOSULFAN II	21.632	59.683	248520	41394	VB
DDT	22.525	79.647	266260	42617	BV
ENDRIN ALDEHY	22.900	58.361	206071	34739	VV
	23.153		47366	7457	VV
	23.283		95667	12770	VB
	23.892		9804	1685	BB
	24.119		7506	1162	BV
	24.279		15456	2433	VV
	24.435		3090	651	VB
	24.785		6473	787	BV
	24.963		11455	1856	VB
	25.359		23332	3077	BB

25.808	14184	1422	BV
25.953	7231	1222	VV
26.122	22971	3056	VV
26.299	20735	1981	VB
26.823	16021	1329	BB
27.345	14727	1524	BB
27.829	28751	3200	BB
29.262	13928	1472	BB
30.177	13176	1333	BB
34.008	20714	1814	BB

Data file: NAI$DIR:[DATA.COMM]H1116043
Report: 41959
Acquired: 17-NOV-1989 22:19:18
Time range: 0.00-34.00



Raw file.....NAI$DIR:[DATA.COMMJG1122022.RAW;1
Sample name.....FA-1 SOX
Acq. date.....23-NOV-1989 00:25:34

Method file.....NAI$DIR:[DATA.COMMJG8081CAL.MET;71
Device.....Channel 7A
Acq. run time.....34.995 min

Author..... FT
Instrument..... IV HP5880
Column type..... DB-1701
length..... *
diameter..... *
Stationary phase.... *
Mobile phase..... *
Detector..... *
Notes..... CLP PEST/PCB ANALYSIS,1 UL INJ.

Analysis type.....EXTERNAL STANDARD A/D range.....1 volt(s)

PEAK LIST

Calibration sample name: AVE

Peak name	R.T.(min)	NG/ML	Peak Area	Peak Ht.	Bl
	0.985		4055	1974	BV
	1.067		50136	9198	VV
	1.201		37057	9081	VB
	1.491		99817	22099	BV
	1.623		88092	23639	VV
HEXACHLOROETH	1.805	4.35E+02	5118946	1032254	VE
	2.212		13102	1825	EV
	2.293		25337	8068	EV
	2.389		1167330	264771	VB
	2.790		62696	15940	BE
	2.929		3732	1073	EB
	3.276		15204	2679	BV
	3.411		24805	3364	VV
	3.579		27977	3959	VB
	4.285		146175	31594	BV
2CHLORONAPHTH	4.526	4.46E+02	46406	7116	VB
	5.885		82944	17550	BB
TETRA-CL-M-XY	7.212	45.901	290505	46655	BB
	8.270		156605	16288	BB
	8.885		74363	14040	BV
4-BR-DIPHENYL	9.028	9.29E+02	84563	9144	VB
A-BHC	10.368	42.981	206436	44811	BB
G-BHC	11.835	59.685	269059	54333	BB
HEPTACHLOR	12.560	40.319	289651	47361	BB
ALDRIN	13.525	38.547	230090	41322	BB
B-BHC	14.520	67.208	226691	37243	BB
	14.838		38855	5945	BB
D-BHC	15.377	27.087	125495	24794	BE
	15.610		4762	882	EB
HEPT.EPOXIDE	16.068	45.694	273754	48820	BB

ENDOSULFAN I	17.035	89.177	456321	82400	BV
G-CHLORDANE	17.199	91.011	628157	108655	VV
A-CHLORDANE	17.477	1.08E+02	613692	105903	VV
DDE	17.750	1.07E+02	442210	71699	VB
DIELDRIN	18.350	45.226	214509	38372	BB
	18.879		235005	39896	BV
ENDRIN	19.099	53.003	197756	34108	VB
ENDOSULFAN II	20.815	77.134	406648	71198	BV
DDT	21.141	1.00E+02	333803	55646	VB
ENDRIN ALDEHY	22.282	95.397	349630	44118	BB
	23.409		9505	1438	BB
	24.500		6678	1121	BB
	24.797		15976	2686	BB
DECACHLOROBIP	28.383	2.1001	14583	1607	BB

Data file: MAI$DIR:[DATA.COMM]G1122022
Report: 43504
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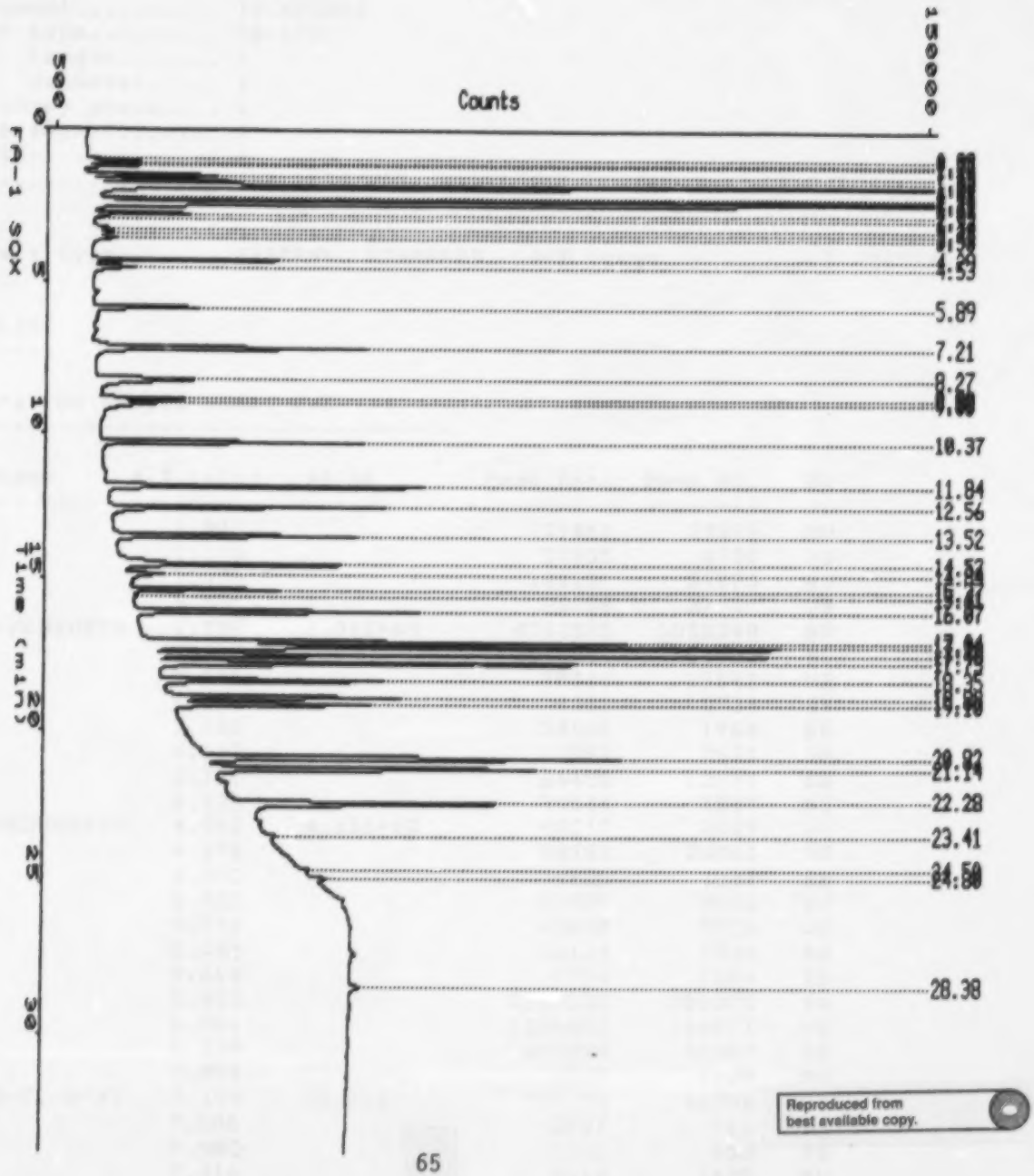
Time range: 0.00-34.00



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Raw file.....NAI$DIR:[DATA.COMMJG1122031.RAW;1
Sample name.....SS-1 SOX
Acq. date.....23-NOV-1989 06:54:14

Method file.....NAI$DIR:[DATA.COMMJG8081CAL.MET;73
Device.....Channel 7A
Acq. run-time.....34.995 min

Author..... ET
Instrument..... IV HP5880
Column type..... DB-1701
length..... *
diameter..... *
Stationary phase.... *
Mobile phase..... *
Detector..... *
Notes..... CLP PEST/PCB ANALYSIS,1 UL INJ.

Analysis type.....EXTERNAL STANDARD A/D range.....1 volt(s)

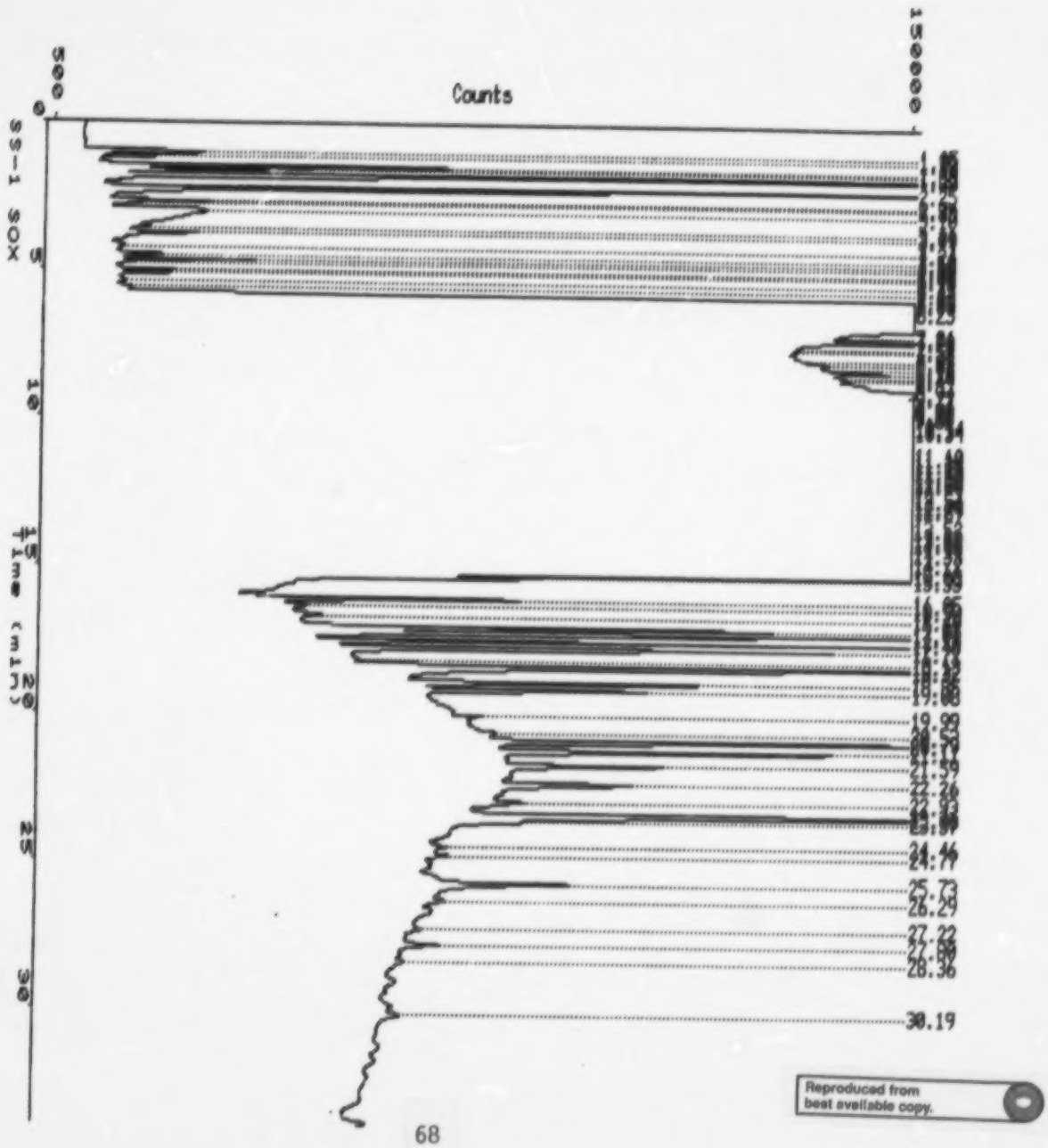
PEAK LIST

Calibration sample name: AVE

Peak name	R.T.(min)	NG/ML	Peak Area	Peak Ht.	Bl
	1.048		129484	19304	BV
	1.196		31335	9737	VB
	1.479		183137	56970	BV
	1.595		78738	27827	VB
HEXACHLOROETH	1.797	4.04E+02	4761535	1028368	BB
	2.245		1818637	464932	BV
	2.741		70913	16942	VE
	2.828		8283	2724	EB
	3.100		23166	1964	BB
	3.613		7862	2631	BB
	3.791		64418	12079	BB
	4.239		19544	2047	BV
2CHLORONAPHTH	4.505	4.35E+02	45240	8009	VV
	4.676		98763	24061	VE
	4.802		9826	2893	EB
	5.033		41859	9692	BV
	5.176		42698	9510	VE
	5.445		13111	1325	EB
	5.664		7774	1384	BB
	5.863		1387226	286375	BV
	6.001		1206052	168071	VE
	6.235		273993	20267	EB
	7.059		3325	1129	BV
TETRA-CL-M-XY	7.199	39.212	248172	44326	VB
	7.506		2707	916	BB
	7.582		1141	653	BB
	7.916		5312	1475	BV
	8.044		19011	2990	VV
	8.168		10622	1963	VV
	8.291		51227	10538	VV

	8.437		5243	1427	VV
	8.493		3160	1337	VB
	8.942		145114	12106	BV
	9.167		2511778	468677	VB
	9.589		6874	1902	BB
	9.707		6779	1511	BB
	9.805		3406	1530	BB
	9.917		6486	1785	BB
	10.137		32784	4229	BV
A-BHC	10.335	1.93E+03	9285044	868149	VE
	11.102		44162	2115	EB
	11.364		35105	5898	BV
	11.529		59118	5963	VV
	11.657		54356	7259	VV
G-BHC	11.809	1.15E+02	520204	83069	VE
	11.938		30341	9752	EV
	11.995		85746	16370	EB
HEPTACHLOR	12.542	78.242	562088	59391	BB
	12.795		31627	4790	BV
	12.887		11378	2702	VB
ALDRIN	13.520	4.41E+02	2631164	139790	BV
	13.825		1945801	151039	VV
	13.960		1258166	172291	VV
	14.021		1147160	179470	VV
	14.335		7597076	274452	VV
	14.718		8694280	436436	VV
	15.079		*******	950514	VE
D-BHC	15.334	24.841	115088	27347	EB
HEPT.EPOXIDE	16.048	48.378	289832	47606	BE
	16.296		89721	8059	EV
	16.602		122959	8068	VV
ENDOSULFAN I	17.012	94.120	481614	82490	VV
G-CHLORDANE	17.176	87.456	603623	106392	VB
A-CHLORDANE	17.455	1.01E+02	575682	101462	BV
DDE	17.718	1.17E+02	484784	85984	VB
	18.131		5835	1165	BB
DIELDRIN	18.321	2.11E+02	1000043	120548	BV
	18.848		316404	51673	VV
ENDRIN	19.077	61.899	230947	39897	VB
	19.991		19552	3895	BB
DDD	20.529	8.9526	30609	3157	BV
ENDOSULFAN II	20.791	84.317	444520	77259	VV
DDT	21.113	1.01E+02	336792	58113	VB
	21.589		173798	26649	BB
ENDRIN ALDEHY	22.260	48.670	178374	22389	BB
	22.927		61432	6905	BB
	23.364		798725	100937	BE
	23.566		43790	6051	EB
	24.463		32994	3105	BV
	24.766		27153	3606	VB
	25.730		291938	24994	BE
	26.290		47243	3363	EB
	27.223		11590	1522	BB
	27.795		52795	6231	BB
DECACHLOROBIP	28.360	2.5619	17790	1533	BB
	30.187		30766	2643	BB

Data file: MAI$DIR:[DATA.COMM]G1122031
Report: 43513
Acquired: 23-NOV-1989 06:54:14
Time range: 0.00-34.00



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Raw file.....NAI$DIR:[DATA.COMMJG1122042.RAW;1
Sample name.....SB-1 SOX
Acq. date.....23-NOV-1989 14:50:15

Method file.....NAI$DIR:[DATA.COMMJG8081CAL.MET;75
Device.....Channel 7A
Acq. run time.....34.995 min

Author..... ET
Instrument..... IV HP5880
Column type..... DB-1701
length..... *
diameter..... *
Stationary phase.... *
Mobile phase..... *
Detector..... *
Notes..... CLP PEST/PCB ANALYSIS,1 UL INJ.

Analysis type.....EXTERNAL STANDARD A/D range.....1 volt(s)

PEAK LIST

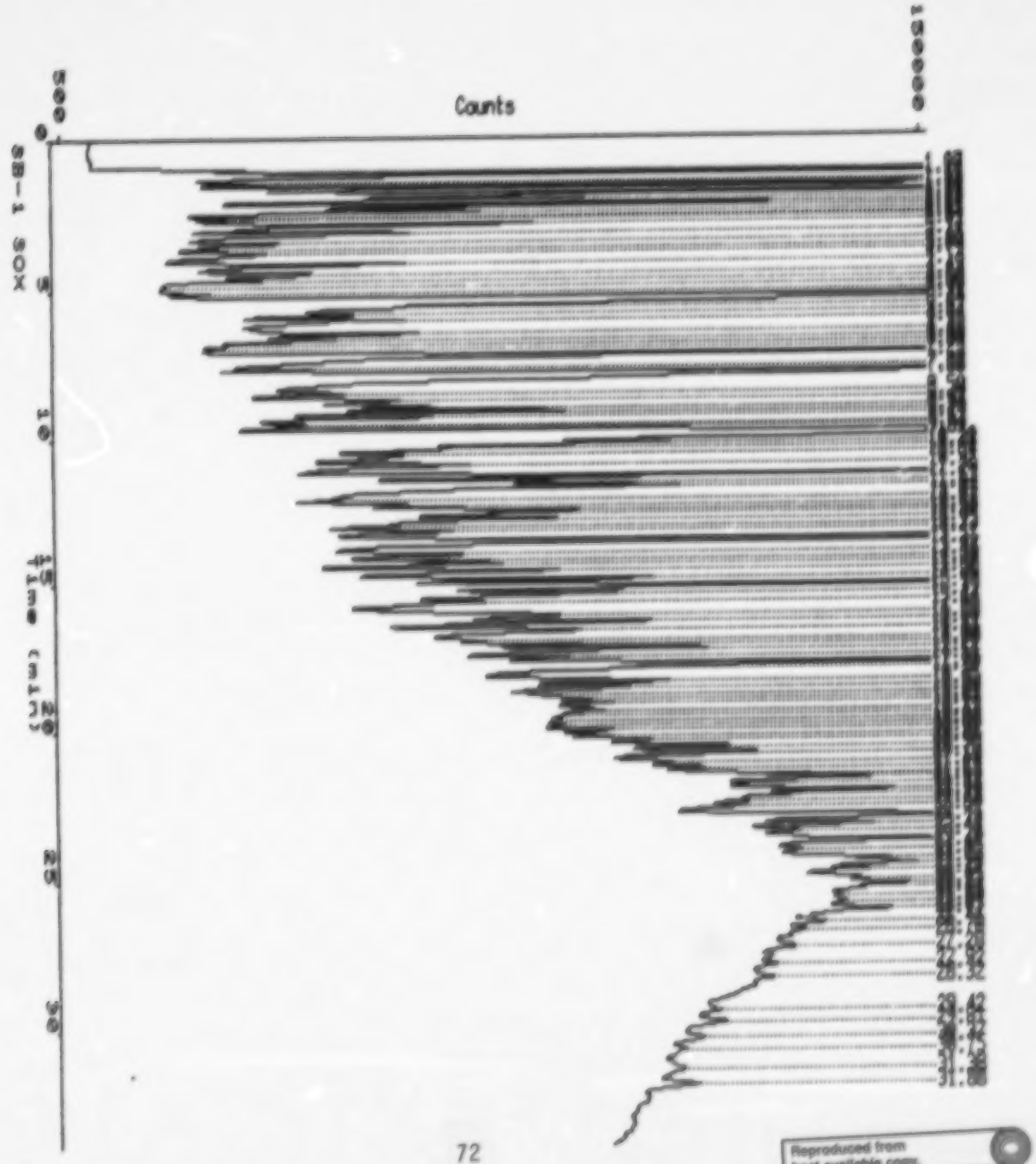
Calibration sample name: AVE

Peak name	R.T.(min)	NG/ML	Peak Area	Peak Ht.	Bl
	1.070		162083	26147	BV
	1.200		1436702	280430	VE
	1.417		75047	14728	EV
	1.492		138596	27107	EV
	1.607		668978	139526	VV
HEXACHLOROETH	1.805	97.141	1144024	284783	VE
	1.878		186717	38924	EV
	1.992		408486	80996	VV
	2.161		580048	111575	VV
	2.282		157976	39849	VV
	2.375		359839	60956	VV
	2.554		71020	15545	VV
	2.621		76102	16038	VV
	2.840		560226	68595	VV
	3.141		378318	45082	VV
	3.463		167530	21441	VV
	3.617		46908	10122	VV
	3.788		177793	18452	VB
	4.133		235680	39346	BB
	4.432		21491	6097	BB
	4.638		35548	9610	BB
	4.881		2065	678	BB
	5.081		32712	7640	BB
	5.319		5641769	866281	BE
	5.637		314441	25642	EV
	5.869		241020	26815	EV
	6.036		349949	38083	EV
	6.475		366045	39385	VV
	6.648		236015	24149	VE
	6.875		9792	2403	EV

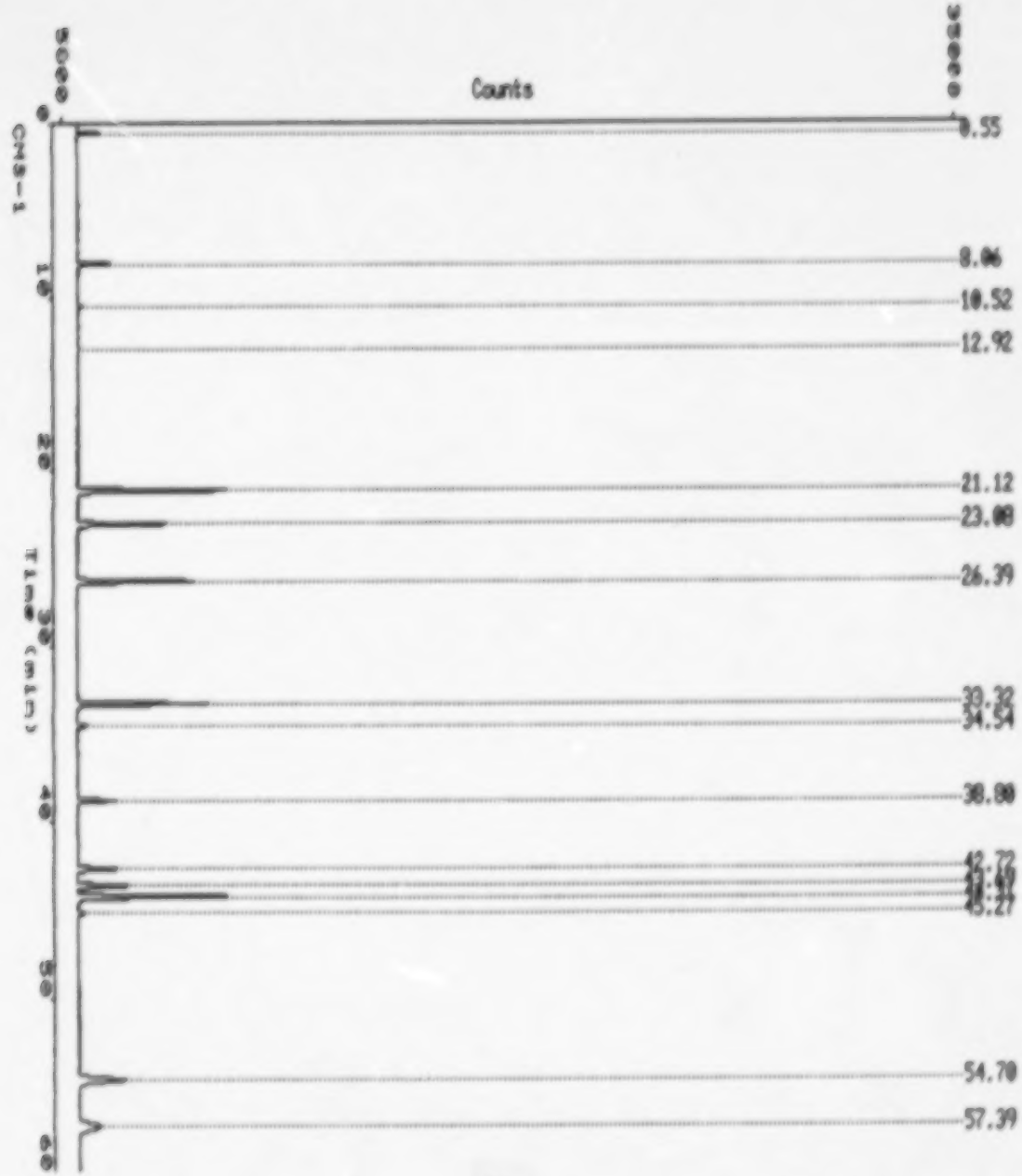
	7.018		4538	1544	EB
TETRA-CL-M-XY	7.229	1.97E+02	1244401	200046	BB
	7.692		9030	2420	BB
	7.863		2339510	181886	BE
	8.502		135234	17882	EV
	8.745		293574	29163	VV
	8.965		321110	35046	VV
	9.112		304428	57377	VV
	9.287		267307	34320	VV
	9.517		81447	11634	VV
	9.627		38591	8244	VB
	9.845		4051564	340657	BE
	10.222		244455	34604	EV
A-BHC	10.378	25.195	121013	14173	EB
	10.610		29128	7021	BB
	10.924		184282	26376	BB
	11.290		1203519	188136	BE
	11.525		270259	43248	EV
	11.674		797664	66143	VE
	12.070		41909	5638	EB
	12.272		157271	19534	BV
	12.457		396294	48209	VV
HEPTACHLOR	12.573	35.499	255026	34885	VV
	12.744		397866	43742	VV
	12.948		95418	16286	VV
	13.131		198210	24939	VV
ALDRIN	13.514	2.84E+02	1695533	230476	VE
	13.975		231664	24991	EV
	14.204		159154	21893	EV
	14.335		195009	31176	EB
B-BHC	14.578	99.232	334709	40272	BV
	14.857		373789	55692	VV
	15.140		1148562	160247	VV
D-BHC	15.386	1.12E+02	518703	46858	VV
	15.635		200741	23603	VB
HEPT.EPOXIDE	16.091	67.490	404331	33312	BV
	16.302		323869	46736	VB
	16.574		345076	31677	BV
	16.903		74431	9878	VV
ENDOSULFAN I	17.057	35.661	182477	26967	VV
G-CHLORDANE	17.217	57.524	397031	47516	VV
A-CHLORDANE	17.512	27.631	157384	20418	VV
DDE	17.760	1.77E+02	729174	94100	VV
	17.902		239596	30223	VB
DIELDRIN	18.349	53.138	252033	30511	BV
	18.533		169489	21758	VB
	18.766		20752	4173	BV
	18.891		46801	7906	VV
ENDRIN	19.025	16.137	60206	11153	VB
	19.291		56296	7970	BE
	19.432		4173	1126	EB
	19.642		6448	1511	BB
	19.799		13179	3066	BB
	20.001		62232	9970	BV
	20.174		21861	4748	VB
	20.358		92598	12370	BV
DDD	20.576	55.773	190687	23888	VV
ENDOSULFAN II	20.784	41.628	219463	26355	VB
DDT	21.101	18.316	60975	7554	BV
	21.268		57369	10086	VV

	21.509		159833	23982	VV
	21.670		327976	31518	VE
	21.873		38083	5963	EV
	22.070		183157	28762	VV
ENDRIN ALDEHY	22.200	13.868	50825	10684	VB
	22.422		14189	2924	BB
	22.602		42024	7575	BB
	22.966		612158	64633	BV
	23.220		227783	31738	VV
	23.421		192893	17926	VV
	23.742		528054	39078	VV
	24.052		180333	14780	VV
	24.325		248461	28459	VV
	24.497		423955	30972	VV
	24.710		228114	23813	VV
	25.049		263575	20318	VV
	25.230		303861	27876	VV
	25.374		202749	19585	VV
	25.616		118670	14265	VV
	25.793		199077	14089	VV
	26.055		285999	20578	VV
	26.464		79652	7481	VV
	26.703		25177	3002	VB
	27.280		28249	3047	BB
	27.918		20968	3181	BB
DECACHLOROBIP	28.323	4.1879	29081	3408	BB
	29.417		33535	2966	BV
	29.811		82552	5822	VB
	30.373		51197	3973	BB
	30.745		15934	2018	BB
	31.376		87312	4431	BV
	31.882		116397	8444	VB

Data file: MAI$DIR:[DATA.COMM]G1122042
Report: 43528
Acquired: 23-NOV-1989 14:50:15
Time range: 0.00-34.00



Data file: MNI$DIR:[DATA.COMM]R1123015
Report: 43445
Acquired: 25-NOV-1989 03:52:37
Time range: 0.00-60.00



QUANT. DATE.....29-NOV-1989 15:28:11.49
DATA FILE.....NAI$DIR:[DATA.COMM]A1123015.RAW;1
ANAL. DATE.....25-NOV-1989 03:52:37
ANAL. RUN TIME.....59.995 MIN
EPA SAMPLE NAME.....CMS-1
NOTES.....

Author..... MK
Instrument..... HP 5880A V
Column type..... DB-608
length..... 30 M
diameter..... 0.53 uM
Stationary phase.... A
Mobile phase..... A
Detector..... EPD
Notes.....

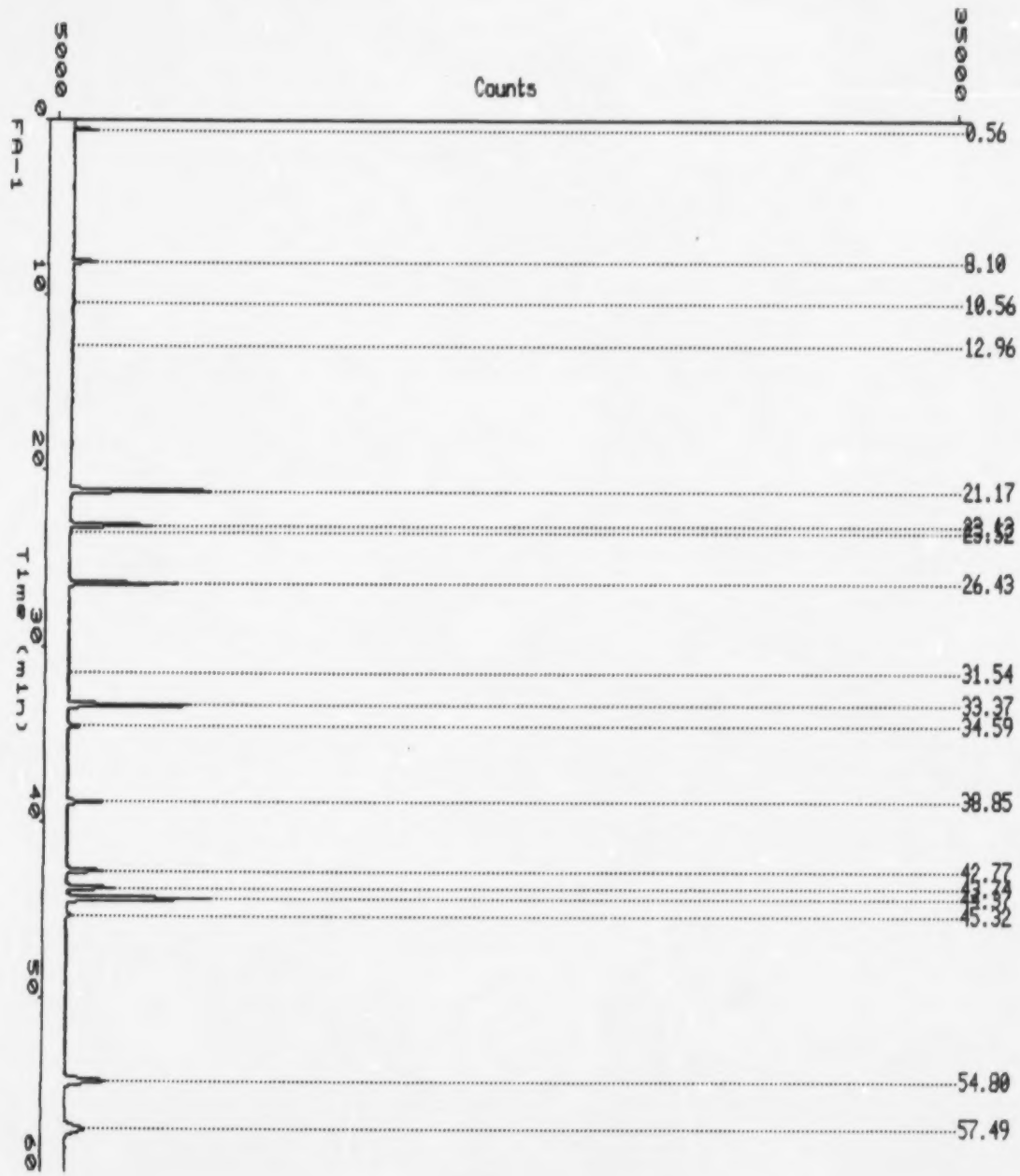
Analysis type.....EXTERNAL STANDARD A/D range.....1 volt(s)
Report units.....ug/mL
Sample amount.....1.000
Volume injected.....1.000 Conversion factor...1.000

EXTERNAL STANDARD ANALYSIS

Calibration sample name: AVE

Peak name	R.T.(min)	ug/mL	Peak Area	Ref Std		Bl
	0.555		2447			BB
DICHLORVOS	8.062	22.864	8208			BB
	10.517		881			BB
	12.919		481			BB
ETHOPROP	21.123	6.0860	46260			BB
PHORATE	23.080	8.3610	26655			BB
DIAZINON	26.385	12.342	36977			BB
ETHYL PARATHIO	33.322	11.708	40357			BB
	34.543		3721			BB
TETRACHLORVINP	38.796	22.009	12875			BB
ETHION	42.717		14053			BB
BOLSTAR	43.688	6.6455	17305			BB
FENSULFOTHION	44.312	24.506	53398			BB
	45.267		1845			BB
METHYL AZINPHO	54.705	11.960	27855			BB
COUMOPHOS (not eluted)	57.388	8.5807	17865			BB

Data file: NAI$DIR:[DATA.COMM]A1123024
Report: 43451
Acquired: 25-NOV-1989 13:35:45
Time range: 0.00-60.00



QUANT. DATE.....29-NOV-1989 15:36:08.05
DATA FILE.....NAI$DIR:[DATA.COMMJA1123024.RAW;1
ANAL. DATE.....25-NOV-1989 13:35:45
ANAL. RUN TIME.....59.995 MIN
EPA SAMPLE NAME.....FA-1
NOTES.....

Author..... MK
Instrument..... HP 5880A V
Column type..... DB-608
length..... 30 M
diameter..... 0.53 uM
Stationary phase.... *
Mobile phase..... *
Detector..... FPD
Notes.....

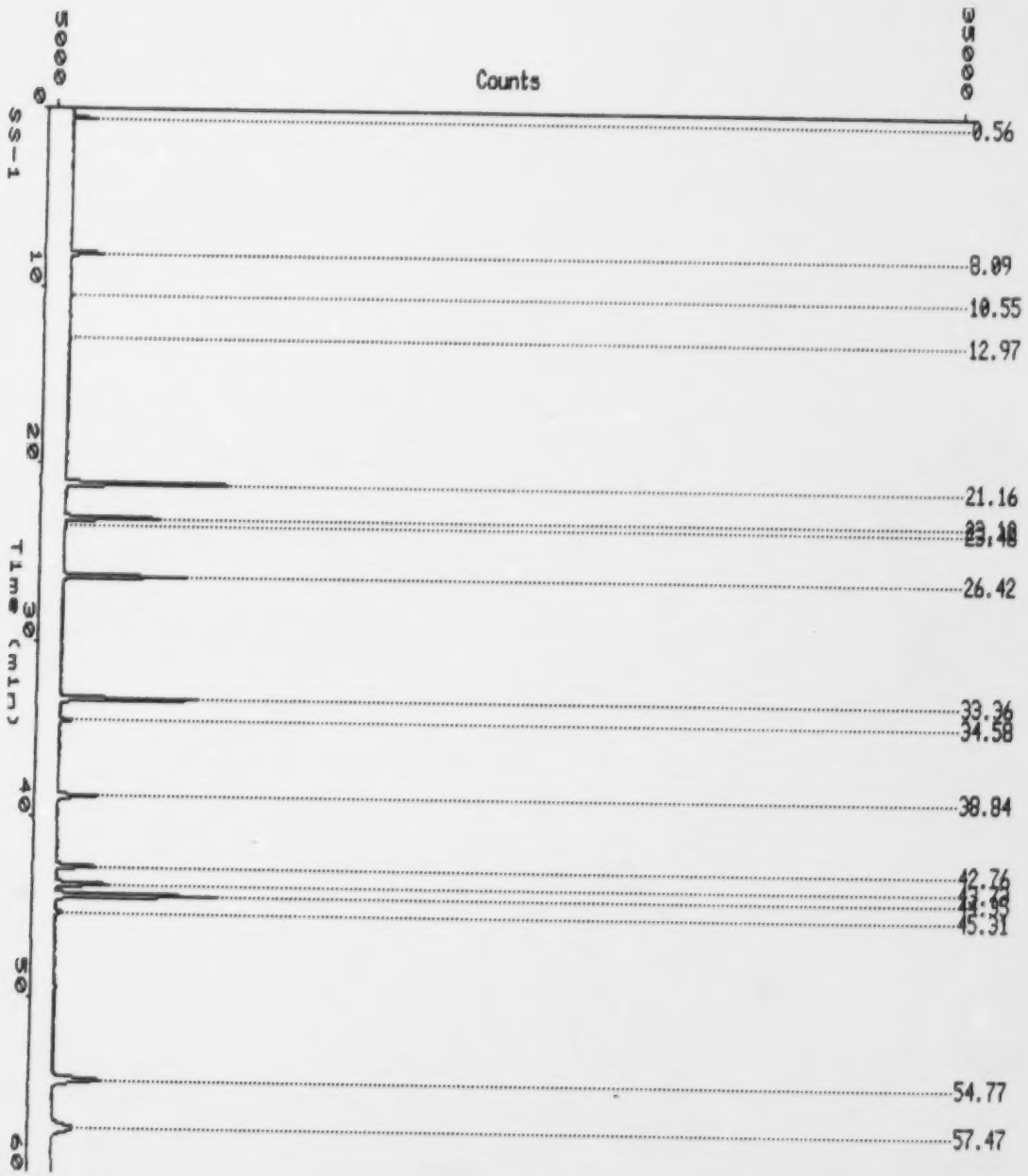
Analysis type.....EXTERNAL STANDARD A/D range.....1 volt(s)
Report units.....ug/mL
Sample amount.....1.000
Volume injected.....1.000 Conversion factor...1.000

EXTERNAL STANDARD ANALYSIS

Calibration sample name: AVE

Peak name	R.T.(min)	ug/mL	Peak Area	Ref Std	Bl
	0.559		2383		BB
DICHLORVOS	8.100	16.844	6047		BB
	10.556		1018		BB
	12.958		301		BB
ETHOPROP	21.170	5.7064	43374		BB
PHORATE	23.125	7.9740	25421		BE
	23.519		371		EB
DIAZINON	26.431	11.546	34593		BB
	31.540		256		BB
ETHYL PARATHIO	33.374	10.731	36989		BB
	34.595		3521		BB
TETRACHLORVINP	38.848	19.291	11285		BB
ETHION	42.771		12797		BB
BOLSTAR	43.743	6.4267	16735		BB
FENSULFOTHION	44.368	23.199	50550		BB
	45.319		1572		BB
METHYL AZINPHO	54.799	10.620	24733		BB
COUMOPHOS	57.490	8.4736	17642		BB

Data file: MAI$DIR:[DATA.COMM]A1123033
Report: 43468
Acquired: 25-NOV-1989 23:18:54
Time range: 0.00-60.00



QUANT. DATE.....29-NOV-1989 16:20:22.81
DATA FILE.....NAI$DIR:[DATA.COMMJA1123033.RAW;1
ANAL. DATE.....25-NOV-1989 23:18:54
ANAL. RUN TIME.....59.995 MIN
EPA SAMPLE NAME.....SS-1
NOTES.....

Author..... MK
Instrument..... HP 5880A V
Column type..... DB-608
length..... 30 M
diameter..... 0.53 uM
Stationary phase.... *
Mobile phase..... *
Detector..... FPD
Notes.....

Analysis type.....EXTERNAL STANDARD A/D range.....1 volt(s)
Report units.....ug/mL
Sample amount.....1.000
Volume injected.....1.000 Conversion factor...1.000

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EXTERNAL STANDARD ANALYSIS

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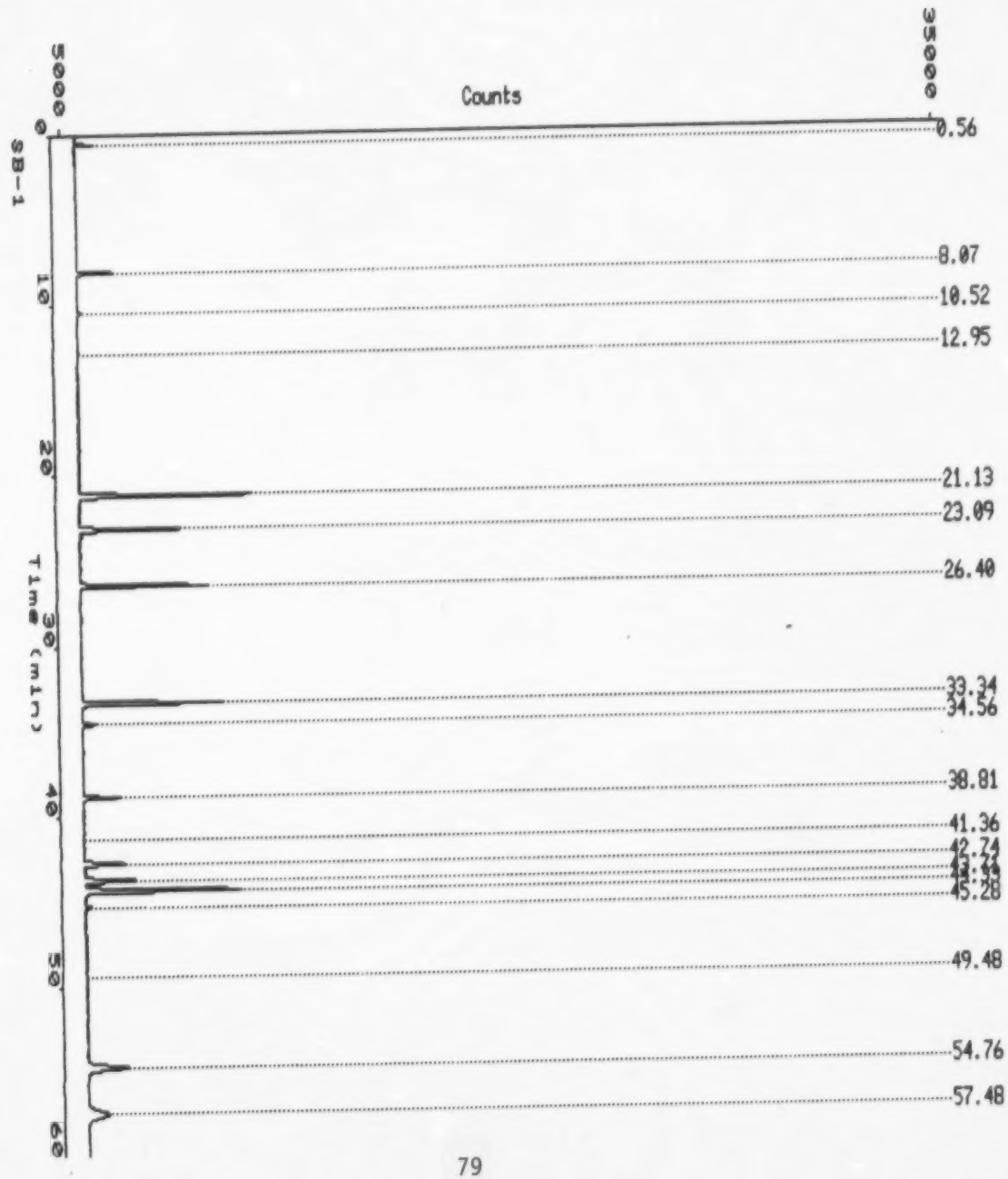
Calibration sample name: AVE

Peak name	R.T.(min)	ug/mL	Peak Area	Ref Std		Bl
	0.559		2657			BB
DICHLORVOS	8.092	22.451	8060			BB
	10.553		717			BB
	12.973		398			BB
ETHOPROP	21.163	6.4384	48938			BB
PHORATE	23.116	9.1801	29266			BE
	23.480		599			EB
DIAZINON	26.422	12.926	38725			BB
ETHYL PARATHIO	33.362	12.265	42279			BB
	34.582		3768			BB
TETRACHLORVINP	38.837	25.203	14744			BB
ETHION	42.757		14643			BB
BOLSTAR	43.730	6.9988	18225			BB
FENSULFOTHION	44.352	25.934	56511			BB
	45.307		1950			BB
METHYL AZINPHO	54.771	12.497	29105			BB
COUMOPHOS	57.466	8.7253	18166			BB

Data file: NAI$DIR:[DATA.COMM]A1123042
Report: 43484
Acquired: 26-NOV-1989 09:01:57
Time range: 0.00-60.00



QUANT. DATE.....29-NOV-1989 17:08:49.86
DATA FILE.....NAI$DIR:[DATA.COMM]A1123042.RAW;1
ANAL. DATE.....26-NOV-1989 09:01:57
ANAL. RUN TIME.....59.995 MIN
EPA SAMPLE NAME.....SB-1
NOTES.....

Author..... MK
Instrument..... HP 5880A V
Column type..... DB-608
length..... 30 M
diameter..... 0.53 uM
Stationary phase.... *
Mobile phase..... *
Detector..... FPD
Notes.....

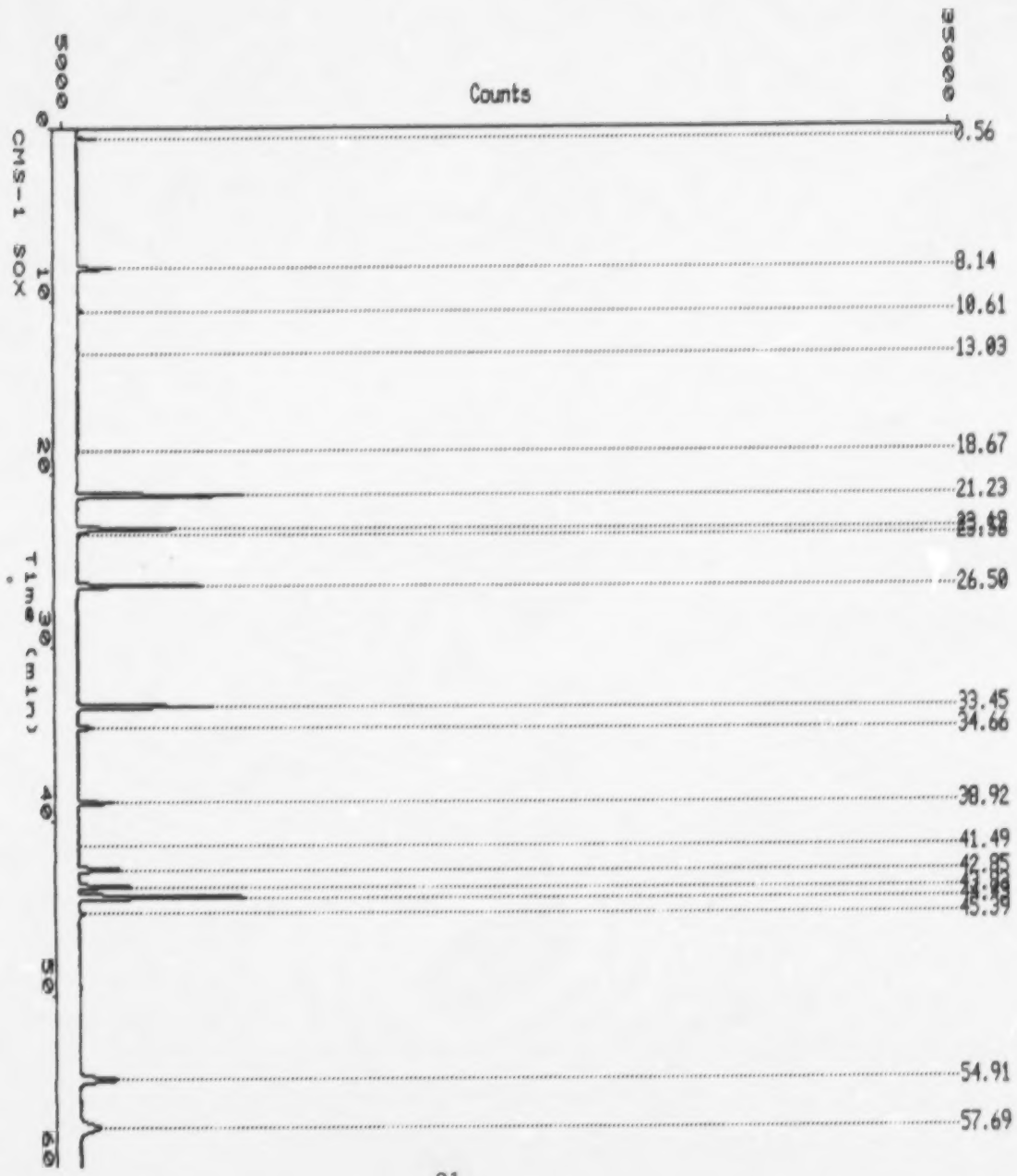
Analysis type.....EXTERNAL STANDARD A/D range.....1 volt(s)
Report units.....ug/mL
Sample amount.....1.000
Volume injected.....1.000 Conversion factor...1.000

EXTERNAL STANDARD ANALYSIS

Calibration sample name: AVE

Peak name	R.T.(min)	ug/mL	Peak Area	Ref Std	Bl
	0.561		2052		BB
DICHLORVOS	8.069	25.184	9041		BB
	10.520		1071		BB
	12.945		536		BB
ETHOPROP	21.133	7.0632	53687		BB
PHORATE	23.089	9.8996	31560		BB
DIAZINON	26.396	13.872	41561		BB
ETHYL PARATHIO	33.337	12.812	44162		BB
	34.560		4282		BB
TETRACHLORVINP	38.813	21.499	12577		BB
	41.361		371		BB
ETHION	42.739		14729		BB
BOLSTAR	43.714	7.2381	18848		BB
FENSULFOTHION	44.330	25.618	55821		BB
	45.284		1818		BB
	49.483		369		BB
METHYL AZINPHO	54.764	11.824	27538		BB
COUMOPHOS	57.483	9.6811	20156		BB

Data file: NAI$DIR:[DATA.COMM]A1123049
Report: 43576
Acquired: 26-NOV-1989 16:35:37
Time range: 0.00-60.00



QUANT. DATE.....30-NOV-1989 09:43:30.61
DATA FILE.....NAI$DIR:[DATA.COMMJA1123049.RAW;1
ANAL. DATE.....26-NOV-1989 16:35:37
ANAL. RUN TIME.....59.995 MIN
EPA SAMPLE NAME.....CMS-1 SOX
NOTES.....

Author..... MK
Instrument..... HP 5880A V
Column type..... DB-608
length..... 30 M
diameter..... 0.53 uM
Stationary phase.... *
Mobile phase..... *
Detector..... FPD
Notes.....

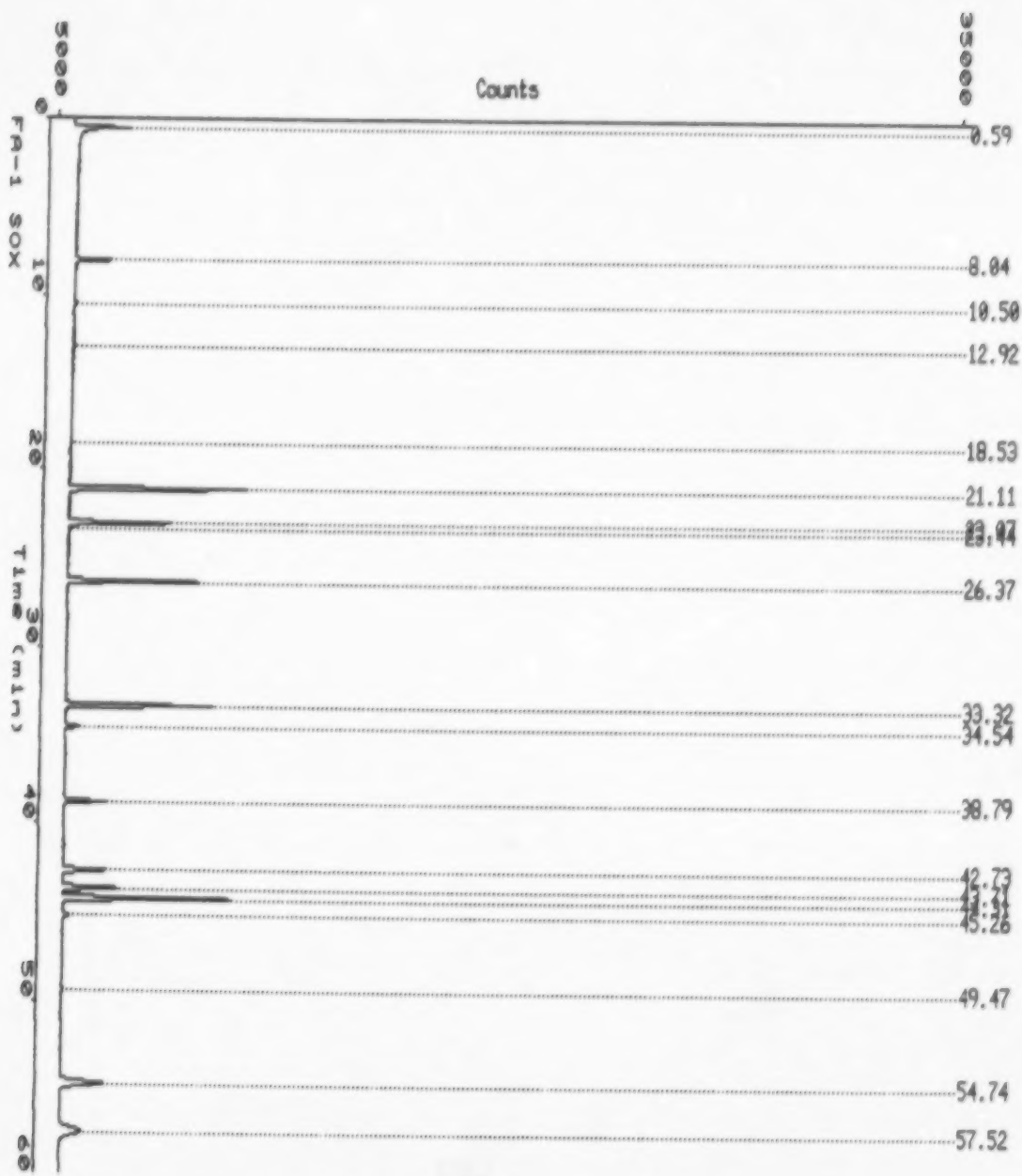
Analysis type.....EXTERNAL STANDARD A/D range.....1 volt(s)
Report units.....ug/mL
Sample amount.....1.000
Volume injected.....1.000 Conversion factor...1.000

EXTERNAL STANDARD ANALYSIS

Calibration sample name: AVE

Peak name	R.T.(min)	ug/mL	Peak Area	Ref Std	Bl
	0.564		2174		BB
DICHLORVOS	8.136	22.989	8253		BB
	10.607		870		BB
	13.032		268		BB
	18.667		337		BB
ETHOPROP	21.232	6.7235	51105		BB
PHORATE	23.195	9.3792	29901		BV
	23.558		490		VB
DIAZINON	26.498	13.239	39664		BB
ETHYL PARATHIO	33.447	12.195	42035		BB
	34.665		5642		BB
TETRACHLORVINP	38.917	19.885	11633		BB
	41.493		338		BB
ETHION	42.852		14593		BB
BOLSTAR	43.834	7.0768	18428		BB
FENSULFOTHION	44.434	26.714	58209		BB
	45.385		1969		BB
METHYL AZINPHO	54.912	10.673	24858		BB
COUMOPHOS	57.688	8.8953	18520		BB

Data file: NAI$DIR:[DATA.COMM]A1123057
Report: #3584
Acquired: 27-NOV-1989 01:14:08
Time range: 0.00-60.00



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ANAL. RUN TIME.....59.995 MIN
EPA SAMPLE NAME.....EA-1 SOX
NOTES.....

Author..... MK
Instrument..... HP 5880A V
Column type..... DB-608
length..... 30 M
diameter..... 0.53 uM
Stationary phase.... *
Mobile phase..... *
Detector..... FPD
Notes.....

Analysis type.....EXTERNAL STANDARD A/D range.....1 volt(s)
Report units.....ug/mL
Sample amount.....1.000
Volume injected.....1.000 Conversion factor...1.000

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EXTERNAL STANDARD ANALYSIS

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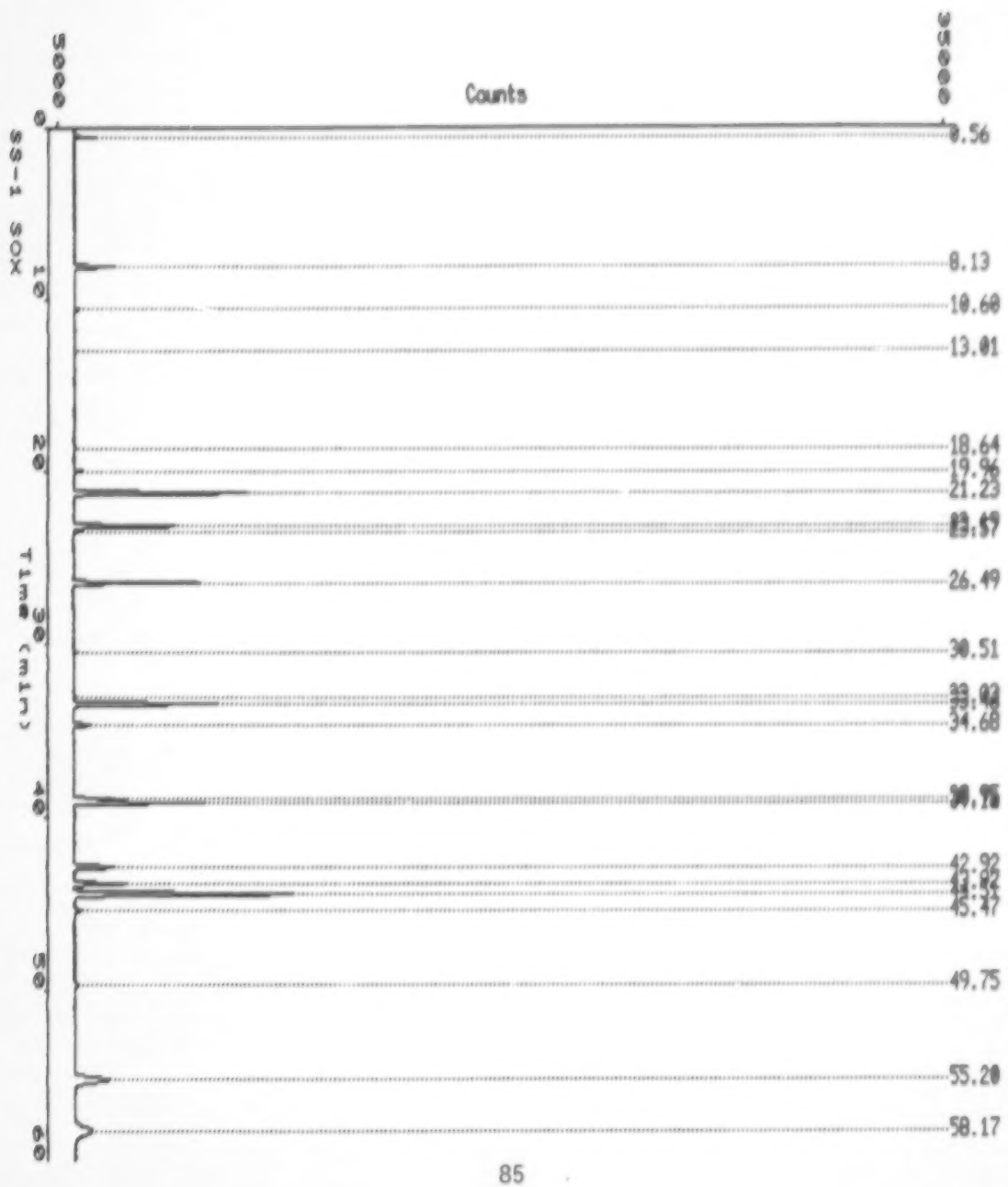
Calibration sample name: AVE

Peak name	R.T.(min)	ug/mL	Peak Area	Ref Std	Bl
	0.587		15697		BB
DICHLORVOS	8.043	24.540	8810		BB
	10.498		871		BB
	12.919		442		BB
	18.535		324		BB
ETHOPROP	21.108	7.0172	53338		BB
PHORATE	23.070	9.7974	31234		BE
	23.436		541		EB
DIAZINON	26.375	13.798	41340		BB
ETHYL PARATHIO	33.319	12.870	44362		BB
	34.538		4627		BB
TETRACHLORVINP	38.790	22.497	13161		BB
ETHION	42.727		15125		BB
BOLSTAR	43.710	7.3633	19174		BB
FENSULFOTHION	44.306	26.790	58375		BB
	45.257		2012		BB
	49.474		367		BB
METHYL AZINPHO	54.745	11.471	26715		BB
COUMOPHOS	57.525	9.6523	20096		BB

Data file: NAI$DIR:[DATA.COMM]A1123066
Report: 43594
Acquired: 27-NOV-1989 10:57:22
Time range: 0.00-60.00



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DATA FILE.....HAI$DIR:[DATA.COMMJA1123066.RAW;1
ANAL. DATE.....27-NOV-1989 10:57:22
ANAL. RUN TIME.....59.995 MIN
EPA SAMPLE NAME.....SS-1 SOX
NOTES.....

Author..... MK
Instrument..... HP 5880A V
Column type..... DB-608
length..... 30 M
diameter..... 0.53 uM
Stationary phase.... A
Mobile phase..... A
Detector..... FPD
Notes.....

Analysis type.....EXTERNAL STANDARD A/D range.....1 volt(s)
Report units.....ug/mL
Sample amount.....1.000
Volume injected.....1.000 Conversion factor...1.000

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EXTERNAL STANDARD ANALYSIS

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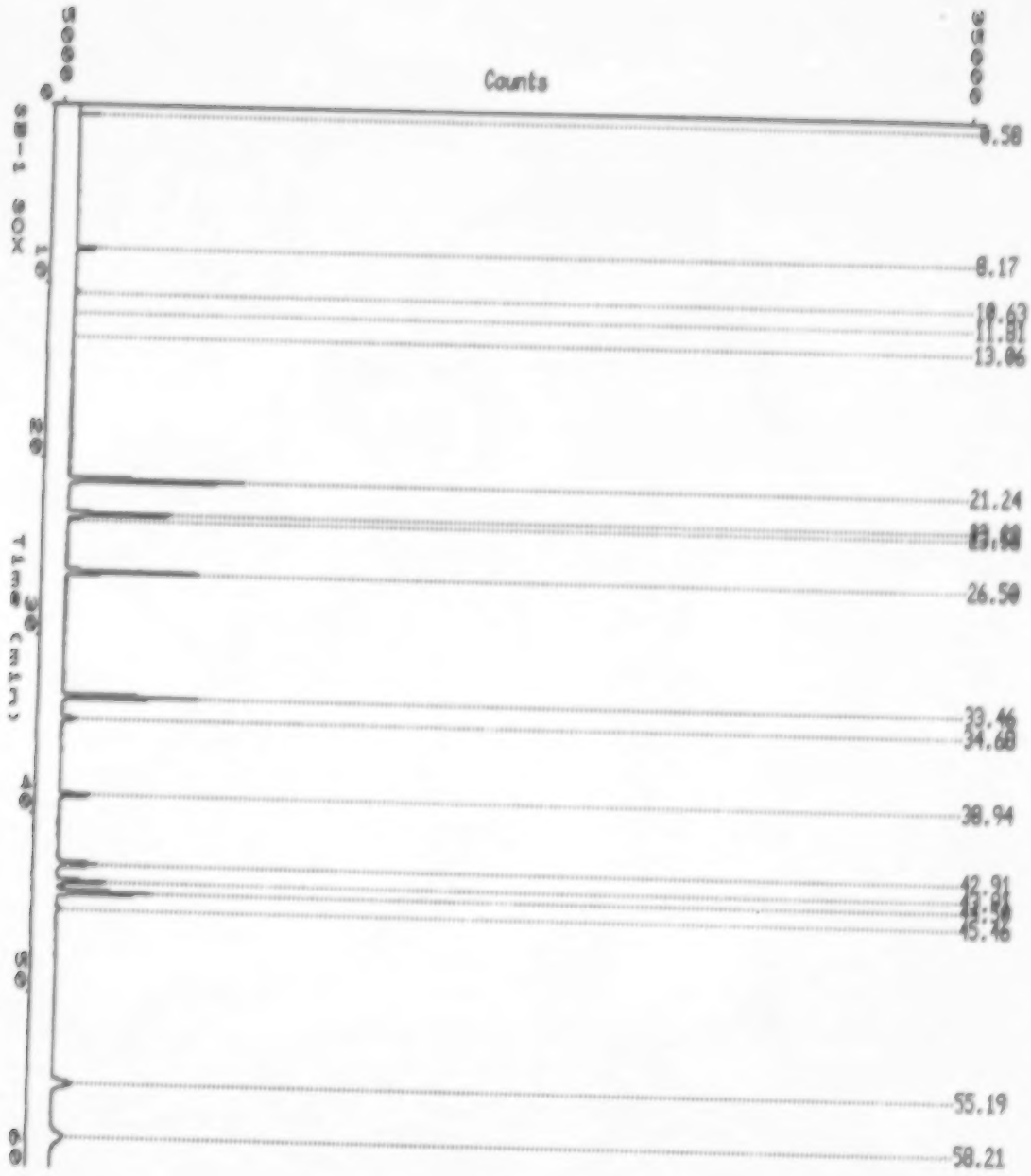
Calibration sample name: AVE

Peak name	R.T.(min)	ug/mL	Peak Area	Ref Std		BL
	0.564		2155			BB
DICHLORVOS	8.129	27.042	9708			BB
	10.604		1151			BB
	13.013		461			BB
	18.638		528			BB
	19.962		2197			BB
ETHOPROP	21.234	7.1562	54394			BB
PHORATE	23.190	9.8457	31388			BE
	23.566		472			EB
DIAZINON	26.495	13.818	41398			BB
	30.511		501			BB
	33.030		236			BV
ETHYL PARATHION (cut)	33.458	12.999	44807			VB
	34.683		5715			BB
TETRACHLORVINP	38.955	19.537	11429			BV
	39.160		33171			VB
ETHION	42.919		14962			BB
BOLSTAR	43.916	7.7654	20221			BB
FENSULFOTHION	44.510	38.215	83271			BB
	45.474		2204			BB
	49.748		1594			BB
METHYL AZINPHO	55.197	10.924	25441			BB
COUMAPHOS	58.166	9.213	19182			BB

Data file: MAI$DIR:[DATA.COMM]R1123075
Report: 43605
Acquired: 27-NOV-1989 20:41:06
Time range: 0.00-60.00



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DATA FILE.....MAI$DIR:[DATA.COMM]A1123075.RAW;1
ANAL. DATE.....27-NOV-1989 20:41:06
ANAL. RUN TIME.....59.995 MIN
EPA SAMPLE NAME.....SB-1 SOX
NOTES.....

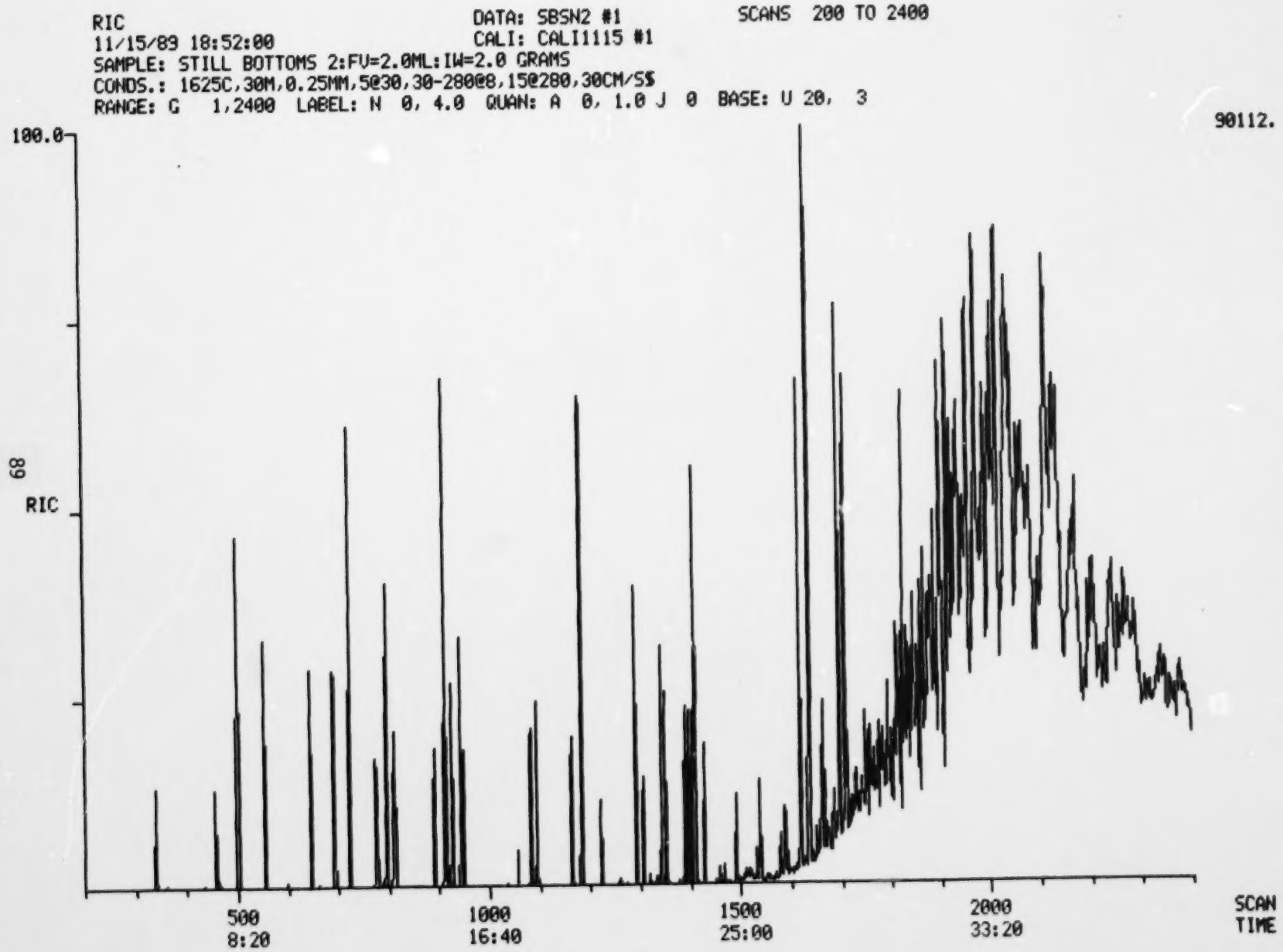
Author..... MK
Instrument..... HP 5880A V
Column type..... DB-608
length..... 30 M
diameter..... 0.53 uM
Stationary phase.... A
Mobile phase..... A
Detector..... FPD
Notes.....

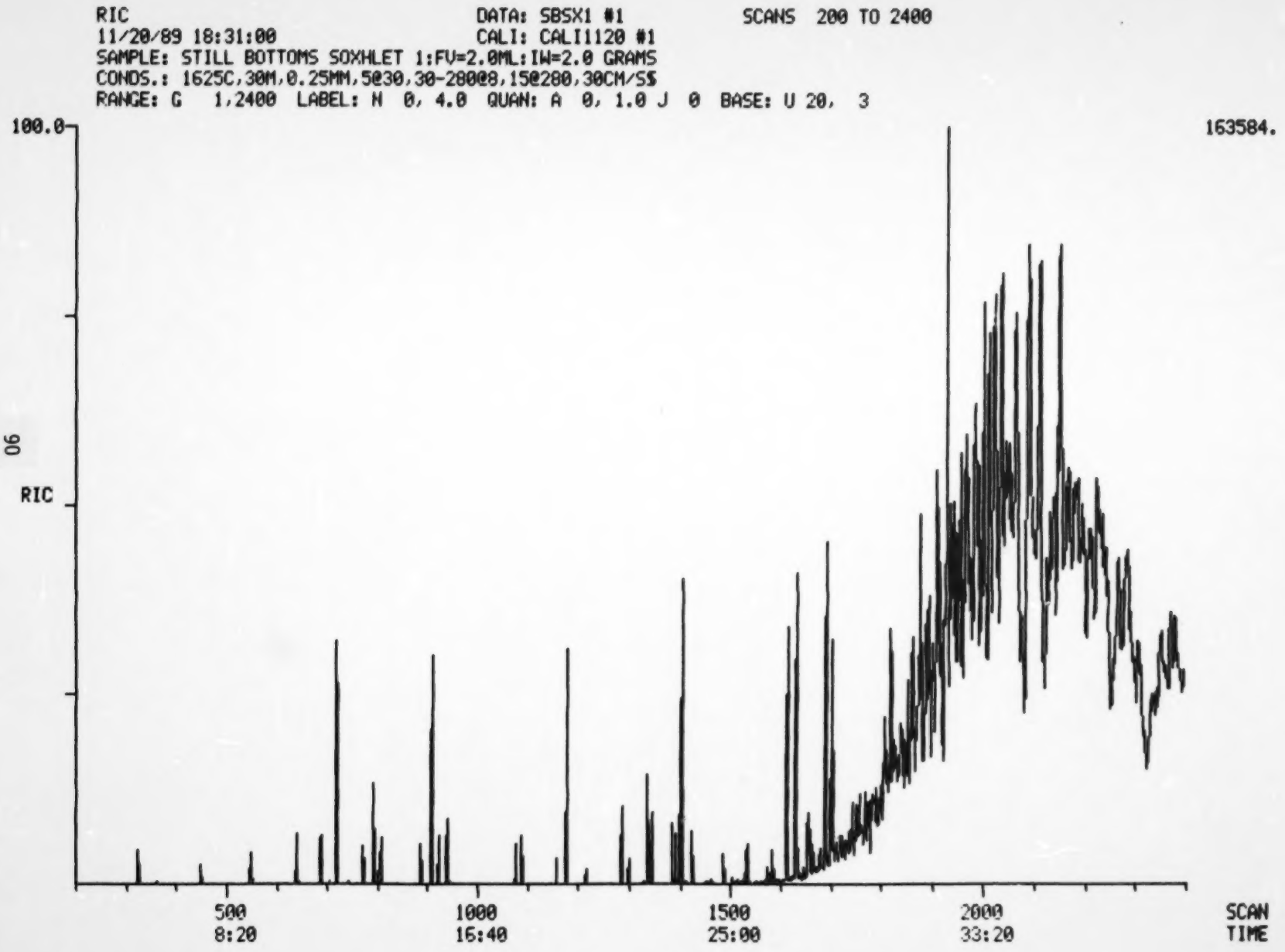
Analysis type.....EXTERNAL STANDARD A/D range.....1 volt(s)
Report units.....ug/mL
Sample amount.....1.000
Volume injected.....1.000 Conversion factor...1.000

EXTERNAL STANDARD ANALYSIS

Calibration sample name: AVE

Peak name	R.T.(min)	ug/mL	Peak Area	Ref Std	Bl
	8.376		1940		BB
DICHLORVOS	8.169	12.657	4544		BB
	10.630		1184		BB
	11.814		252		BB
	13.058		431		BB
ETHOPROP	21.236	6.9437	52779		BB
PHORATE	23.199	9.8454	31387		BE
	23.564		642		EB
DIAZINON	26.498	13.875	41570		BB
ETHYL PARATHION	33.456	11.879	40947		BB
	34.678		4413		BB
TETRACHLORVINP	38.942	16.407	9598		BB
ETHION	42.907		15040		BB
BOLSTAR	43.908	6.8614	17867		BB
FENSULFOTHION	44.499	15.664	34131		BB
	45.461		1598		BB
METHYL AZINPHO	55.190	5.5663	12964		BB
COUMAPHOS	58.210	6.7219	13995		BB


RIC
11/15/89 18:52:00
DATA: SBSN2 #1
CALI: CALI1115 #1
SCANS 200 TO 2400
SAMPLE: STILL BOTTOMS 2:FV=2.0ML:IW=2.0 GRAMS
CONDS.: 1625C,30M,0.25MM,5@30,30-280@8,15@280,30CM/S$
RANGE: G 1,2400 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
90112.
100.0
89
RIC
500
8:20
1000
16:40
1500
25:00
2000
33:20
SCAN
TIME


RIC
DATA: SBSX1 #1
SCANS 200 TO 2400
11/20/89 18:31:00
CALI: CALI1120 #1
SAMPLE: STILL BOTTOMS SOXHLET 1:FV=2.0ML:IW=2.0 GRAMS
CONDS.: 1625C,30M,0.25MM,5@30,30-280@8,15@280,30CM/S$
RANGE: G 1,2400 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
100.0
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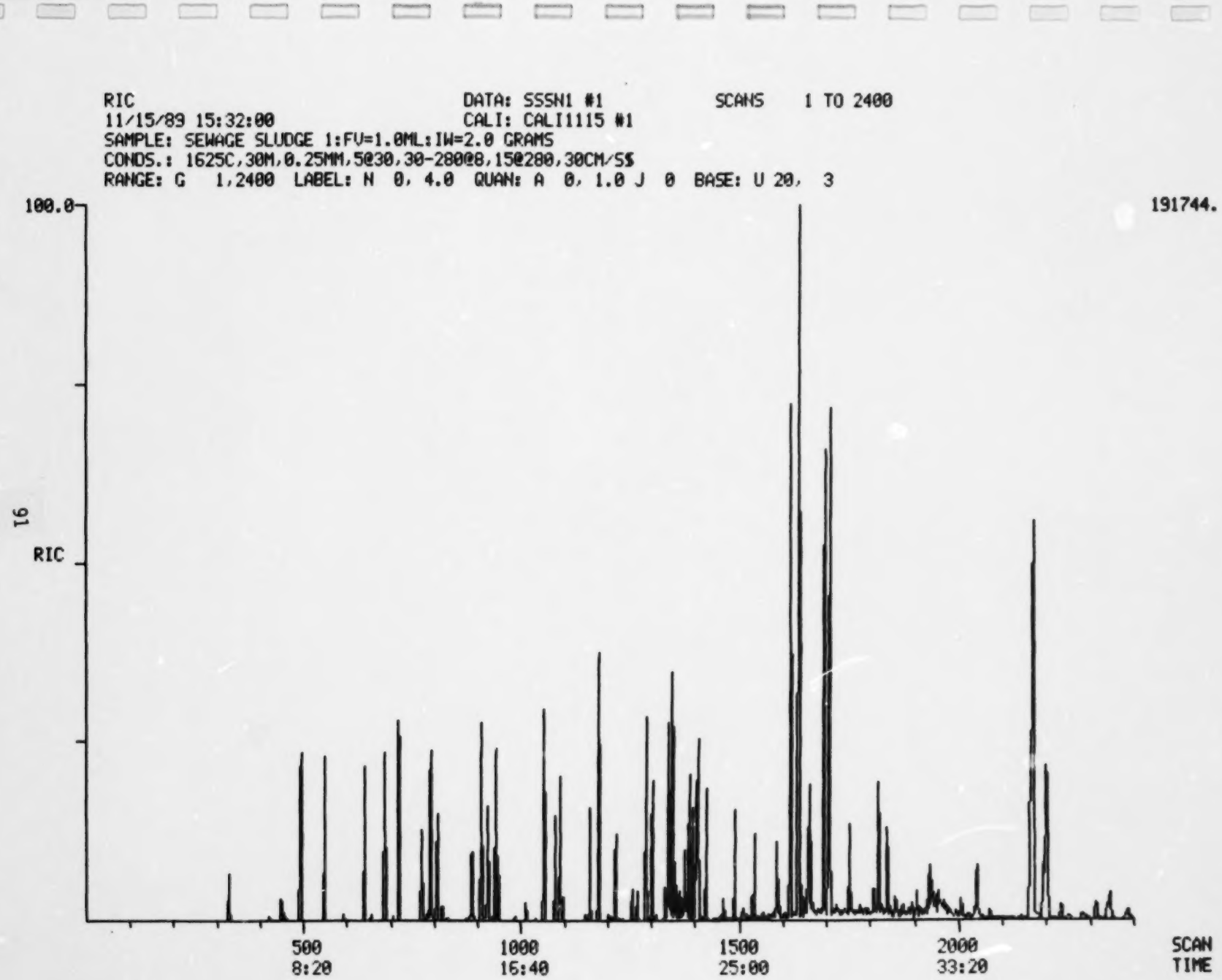
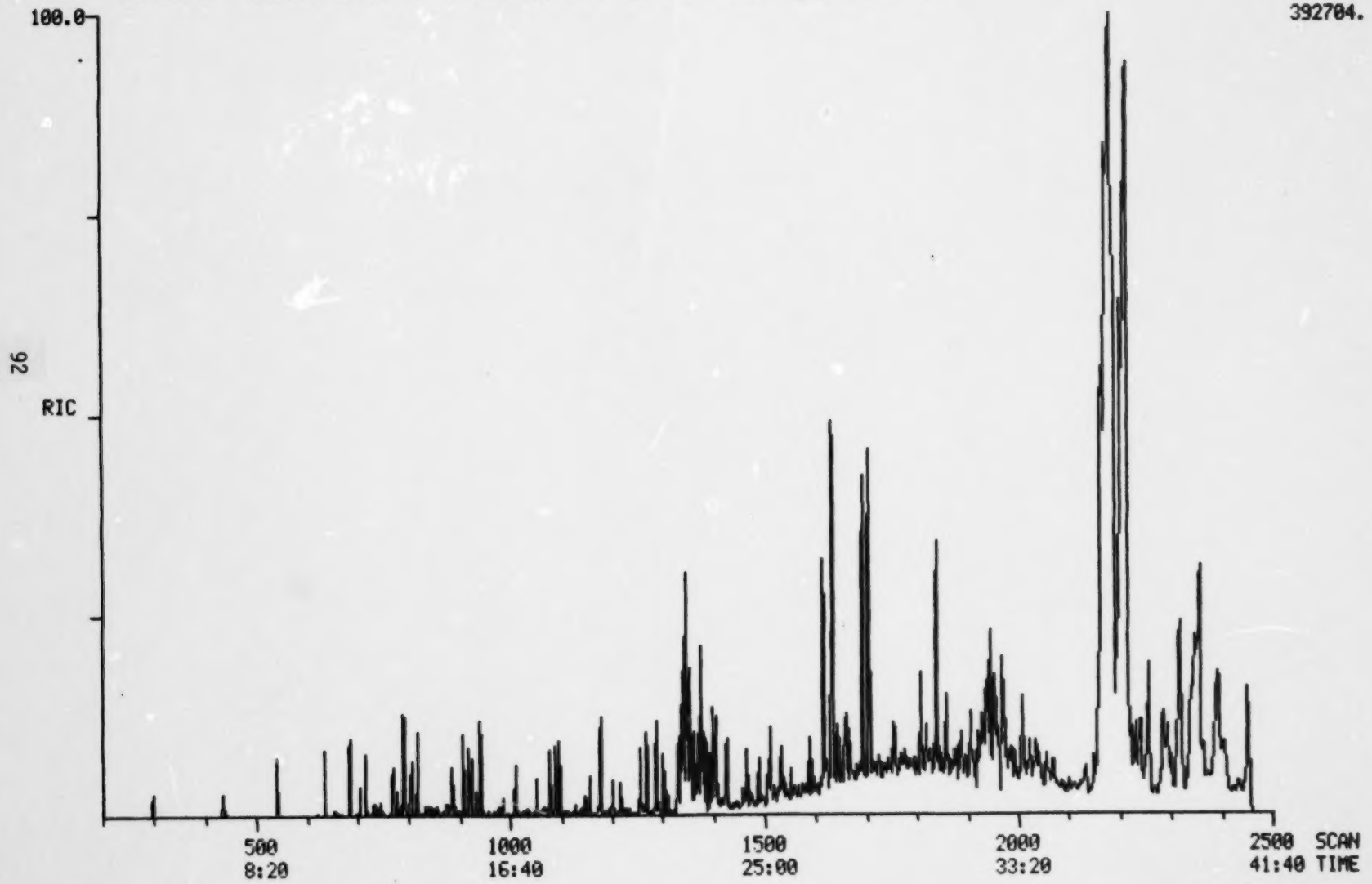
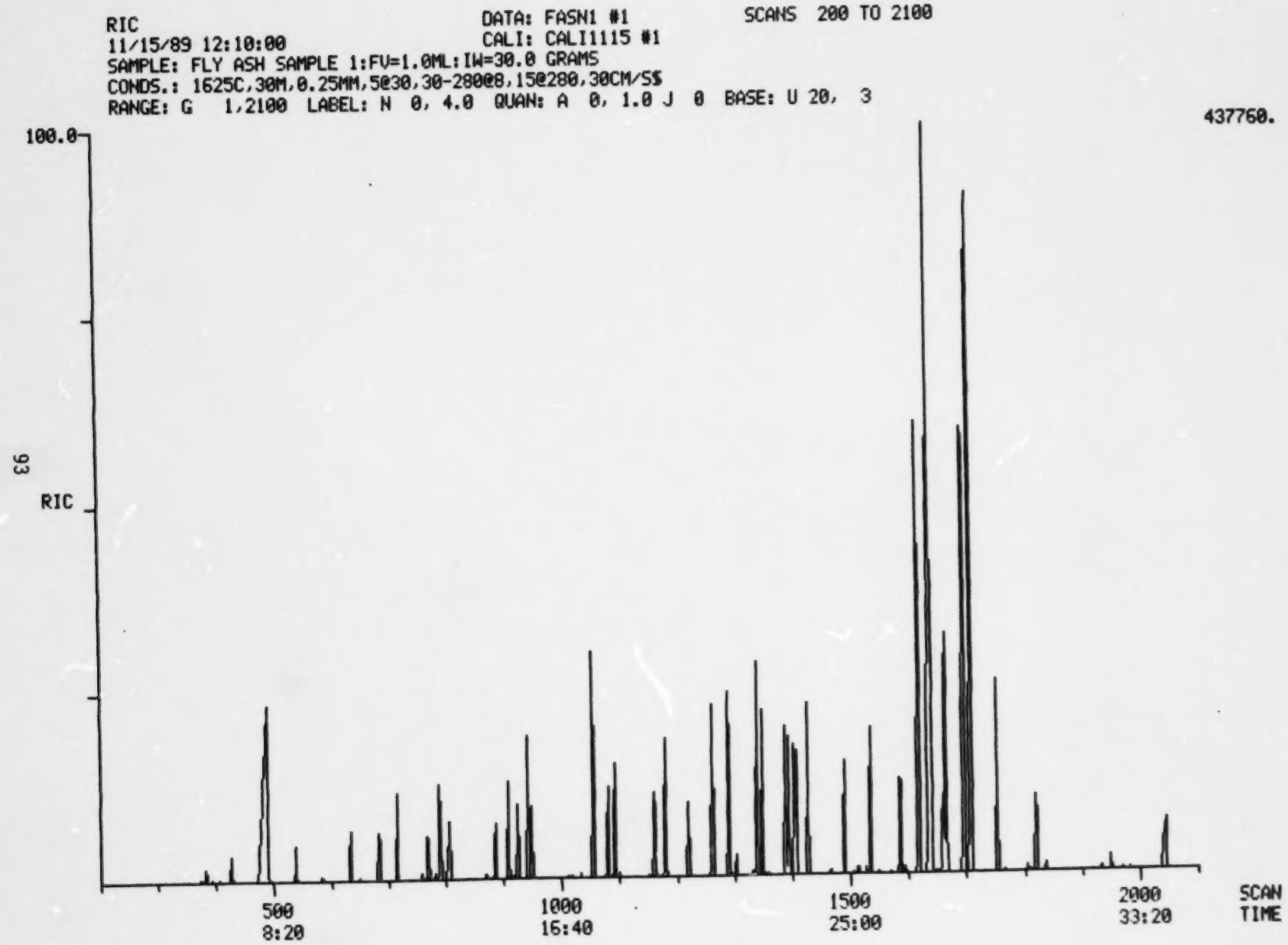
90
RIC
500
8:20
1000
16:40
1500
25:00
2000
33:20
SCAN
TIME


RIC
DATA: SSSN1 #1
SCANS 1 TO 2400
11/15/89 15:32:00
CALI: CALI1115 #1
SAMPLE: SEWAGE SLUDGE 1:FV=1.0ML:IW=2.0 GRAMS
CONDS.: 1625C,30M,0.25MM,5@30,30-280@8,15@280,30CM/S$
RANGE: G 1,2400 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
100.0
191744.
91
RIC
500
8:20
1000
16:40
1500
25:00
2000
33:20
SCAN
TIME

RIC DATA: SSSX1 #1 SCANS 200 TO 2500
11/20/89 15:42:00 CALI: CALI1120 #1
SAMPLE: SEWAGE SLUDGE SOXHLET 1:FV=1.0ML:IW=10.0 GRAMS
CONDS.: 1625C,30M,0.25MM,5@30,30-280@8,150280,30CM/S$
RANGE: G 1,2500 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3




RIC
11/15/89 12:10:00
DATA: FASN1 #1
CALI: CALI1115 #1
SCANS 200 TO 2100
SAMPLE: FLY ASH SAMPLE 1:FV=1.0ML:IW=30.0 GRAMS
CONDS.: 1625C,30M,0.25MM,5@30,30-280@8,15@280,30CM/S$
RANGE: G 1,2100 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
437760.
100.0
93
RIC
500
8:20
1000
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1500
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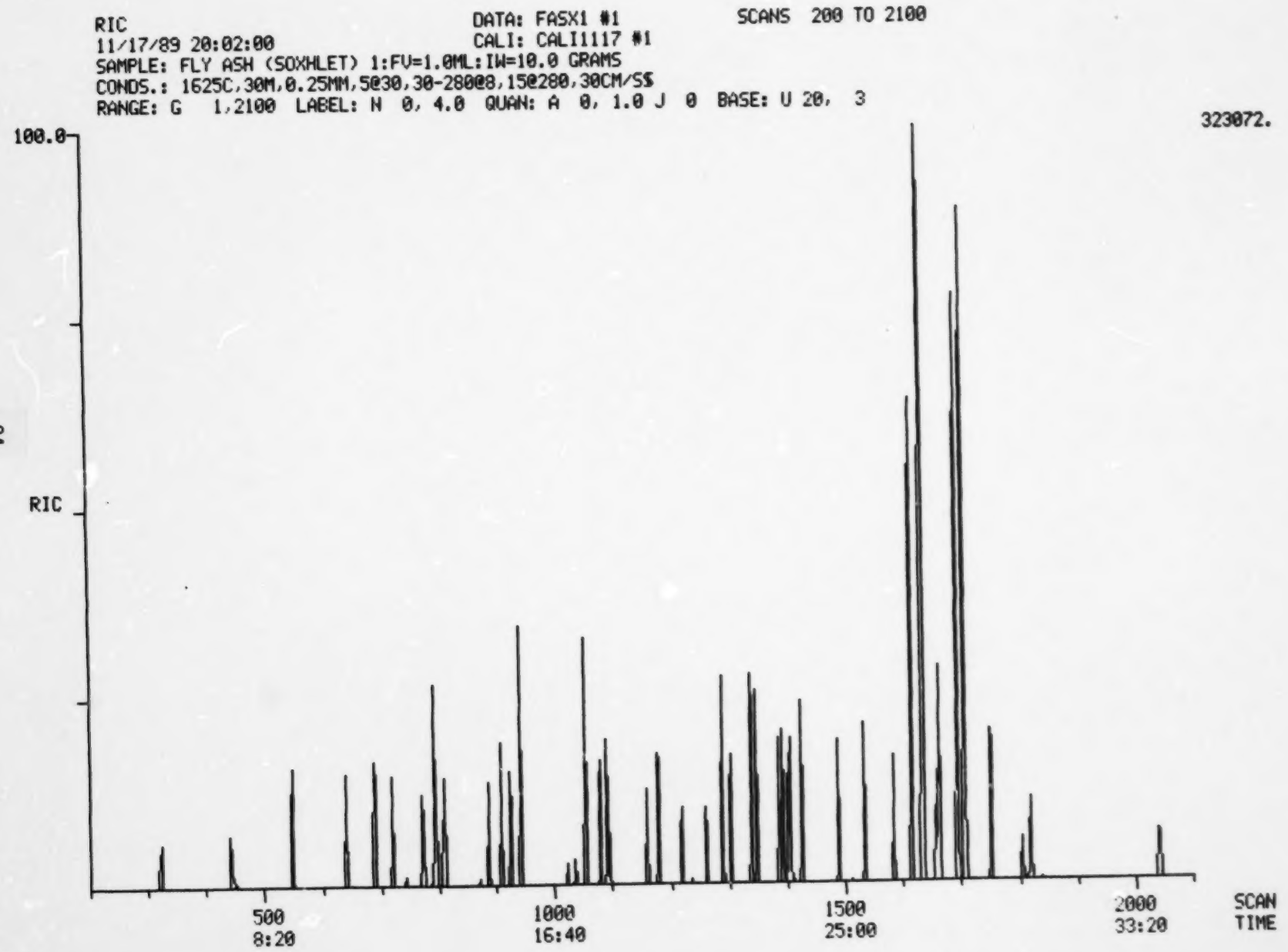
2000
33:20
SCAN
TIME


RIC
11/17/89 20:02:00
DATA: FASX1 #1
CALI: CALI1117 #1
SCANS 200 TO 2100
SAMPLE: FLY ASH (SOXHLET) 1:FV=1.0ML:IW=10.0 GRAMS
CONDS.: 1625C,30M,0.25MM,5@30,30-280@8,15@280,30CM/S$
RANGE: G 1,2100 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
323072.
100.0
94
RIC
500
8:20
1000
16:40
1500
25:00
2000
33:20
SCAN
TIME